ELECTRICAL REVIEW

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The Zipernowsky Electrostatic Electro-Motor.

The well-known phenomenon that bodies charged with identical electricity repel each other, was first used in 1780 by Franklin for the production of continuous motion. He employed a horizontal wheel constructed of horizontal strips of glass fitted at each end with copper balls. The wheel was placed upon a point between the balls of two Leyden jars with opposite charges, so that two diametrical balls of the wheel became charged similarly with those of the jars and were consequently repelled by the latter. After a revolution of 180°, each ball discharged itself on the ball of the opposite Leyden jar receiving at the same time a part of the electricity there accumulated, and was repelled. Franklin named this apparatus an electrical kitchen jack.

Poggendorff subsequently showed that a movable disc of glass or ebonite begins to rotate if opposite electricities are conveyed to it by means of two diametrically opposite combs, and if at the same time it receives an initial impulse in any direction.

Poggendorff also set a Holtz influence machine in rotation by charging the combs of this machine by another influence machine.

In order to study the so-called static effects of high tension alternating currents, Herr Zipernowsky, amongst others, has constructed a small rotatory apparatus which he derived from Thomson's quadrant electrometer in the idiostatic form indicated by Joubert. Zipernowsky has been able to set this apparatus in rapid motion both with a high tension alternating current and with a high tension continuous current. In the former case he introduced the apparatus between the secondary terminals of a transformer whose primary was connected to an alternating current machine of low tension. With 1,000 volts the rotation was so rapid that it could not be followed with the eye.

In the second case he took the electricity from a driving band which connects the shafting in the testing room of the electro-technical department of Ganz & Co.'s establishment with the motor, a high speed steam engine. In this case the number of rotations was much greater than with a 2,000 volt alternating current. Our London namesake publishes the following description of this machine:

Fig. 1. gives a perspective view of this small motor, and Fig. 2 a diagrammatic representation, with the arrangement of connections shown in both the cases.

The movable part of the apparatus consists of two pairs of aluminium sectors, insulated from each other, which, for the sake of perspicuity, are represented in Fig. 2 as the quadrants, *A A'*, *B B'*. The fixed part consists of four double (hollow) sectors of brass, which enclose the movable sectors, and which are also shown in the diagram as the quadrants, *C C'*, *D D'*. The movable part is further fitted with a commutator in four parts, by means of which the two pairs of sectors, *A A'* and *B B'*, are charged identically with the opposite fixed pairs of sectors by means of the points, *S S'*. If the clamps, *K K'*, are connected with the terminals, *S S'*, of the transformer, *T*, which converts the low tension of the alternating current machine, *M*, into a high tension, the apparatus begins to revolve spontaneously unless the movable sectors are placed exactly opposite to the fixed ones. The same takes place if one clamp is connected with the receiving device, *V*, and the other is connected with the earth. It must be remarked that in this second arrangement a momentary charge of

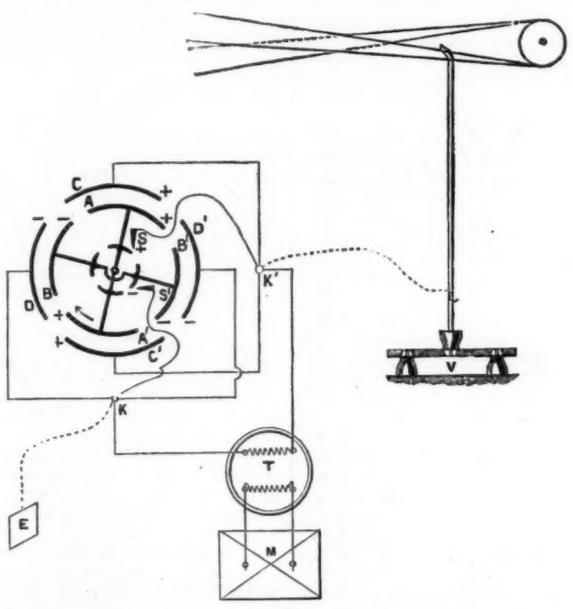

Fig. 2.

the movable sectors would suffice, as the fixed segments do not alter the sign of their charge. In the former arrangement the charge must be continued, so that the electricities in the fixed and the movable parts may change their signs simultaneously.

It is possible that this apparatus, in some form or other, will be suitable for practical purposes, *e. g.*, as a volt-counter for arc lamps in series, as a registering apparatus for the resistance of earth connections, or for changes in the primary tension in alternating current circuits, and perhaps in the case of very high tensions as a motor.

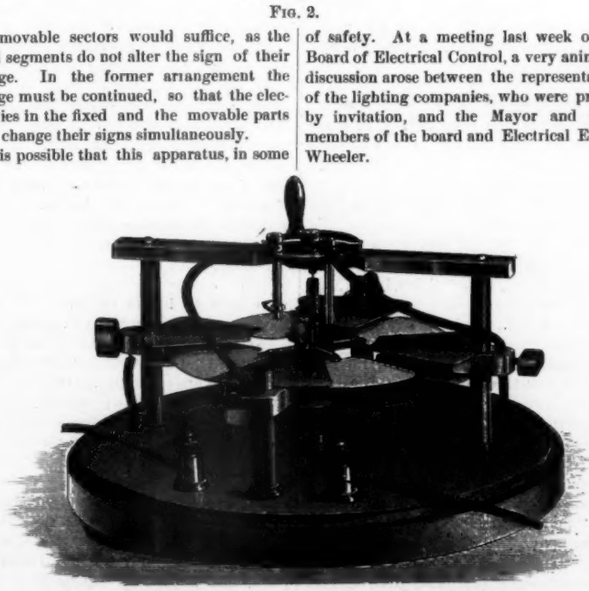

Fig. 1.—The Zipernowsky Electrostatic Electro-Motor.

Electric Lighting in New York City.

The task of supplying this great city with the electric light is not an easy one. There are too many things to consider besides the question of selling light to customers at a reasonable profit. Mayor Grant is again after the companies, this time on the question of safety. At a meeting last week of the Board of Electrical Control, a very animated discussion arose between the representatives of the lighting companies, who were present by invitation, and the Mayor and other members of the board and Electrical Expert Wheeler.

The following resolution was finally presented by the Mayor and adopted:

"*Resolved*, That notice be given to all companies operating and furnishing electric lights on overhead wires in the city of New York to discontinue the use of such overhead wires as are not properly insulated until such time as said wires shall be certified to by the expert of this Board to be in proper condition."

The Western Union Telegraph Company and its Work.

The annual meeting of the stockholders of the Western Union Telegraph Company was held last week at the head offices of the company, 195 Broadway. The $80,000,000 of its capital stock is said to be pretty well distributed outside of the $20,400,000 held by Mr. Jay Gould. The meeting was remarkable as evincing the confidence that the holders of the other $60,000,000 of stock have in the present management. The holders of 393,000 shares, or less than one-half of the capital, sent in their proxies to the regular proxy committee, and they were voted for the board of directors who served last year. No one appeared in opposition.

The tellers and inspectors of election were there, of course, but the only stockholders who showed up were President Norvin Green, Vice-President and General Manager Thomas T. Eckert, Director John T. Terry, and Secretary A. R. Brewer. Mr. Terry presided. Dr. Green read the annual report, and Messrs. Eckert and Brewer were unanimous in approving it.

The showing made by the company for its fiscal year ending June 30 last is the best in its history. In comparison with recent years it is best presented in the following tabulated form:

	1889.	1888.	1887.
Gross revenue...	$20,783,194	$19,711,164	$17,191,909
Opera'g expenses.	14,765,152	14,640,592	13,154,628
Net earnings..	$6,218,041	$5,070,571	$4,037,281
Interest and Sinking Fund.....	835,655	530,258	533,065
Balance	$5,382,386	$4,540,313	$3,504,216
Dividends.....	4,309,520	4,043 949	811,864
Surplus.....	$1,072,866	$496,364	$2,692,352
Total Surplus.....	$8,611,401	$7,498,548	$7,002,185
Miles of pole.....	178,754	171,975	156,814
Miles of wire.....	647,697	616,248	524,641
Messages sent	54,108,326	51,463,955	47,394,530

The cost per message was 22.4 cents, against 23.2 cents the previous fiscal year, and the average rate received was 31.2 cents per message both years. In 1869 the average rate per message was 75½ cents, and in 1879 it was 38.6 cents. With one exception the average rate received is the lowest in the history of the company. The report says of the company's growth during the last ten years that it has been in mileage of lines 115 1/10 per cent., in mileage of wire over 206 per cent, in number of offices 116 1/10 per cent., and in number of messages sent 115 8/10 per cent. "Its revenues have not correspondingly increased on account of the great reduction in rates of tolls. It will be observed that the average tolls collected on messages for the past four years is less than one-half the average cost to the company of handling messages 20 years ago.

"The additions to the property last year were 7,379 miles of line, 31,499 miles of wire, and the equipment of 1,229 additional offices, of which 4,814 miles of line and 8,701 miles of wire were purchased and acquired under contracts with railroad companies, and 2,565 miles of line and 22,748 miles of wire were constructed directly by the company. There was expended for these acquisitions during the year out of the surplus earnings $1,141,010.72. The investment of earnings in new property during the year was nearly equal to 1½ per cent. on the capital stock, and the returns already received demonstrate clearly that the investment is of more value to the stockholders than if paid to them in additional cash dividends."

The company is laying two cables between New York and Newfoundland. The cables are already constructed, and the steamer "Faraday" sailed last Thursday with them to the coast of Newfoundland. This will give the Western Union uninterrupted communication with Europe, and avoid any possible interruption arising from storms which have interrupted their land lines.

Electric Launches on the Thames.

BY PROF. G. FORBES.

This paper on "Electric Launches on the Thames' has risen out of the fact that during the past summer, while I was living down the river at Bray, I was enabled to have the opportunity of keeping one of those electric launches, which have been built by Messrs. Tagg lately, and electrically equipped by Messrs. Immisch. I thought it would be interesting to draw attention to one's experiences in this connection. I speak not only from my own observations, but from those of everyone who has used them on the river, and also the views of a very large number of those who have seen the performances of these boats and watched them, and who are habituated to the river, when I say that there is hardly the slightest doubt that in the course of a very few years the steam launch as a pleasure boat on the River Thames will be entirely abolished.

On the River Thames there are some special peculiarities which make the electric launch peculiarly suitable, and it by no means follows from what I have said that in other cases the electric launch will be as speedily and universally adopted. Among the points worthy of notice are—in the first place, that launches on the river are required chiefly in summer, when the heat, smoke, smell, oil and dirt of a steam launch are objectionable; and also that, owing to the larger traffic, and to prevent injury to banks and boats which are tied to the banks on the river, it is impossible on the Thames to allow high speeds in launches. Hence a comparatively small supply of storage batteries or accumulators is required for driving the electric launches at the very moderate speeds which are permissible on the River Thames.

It may also be added that on the Thames it is easy to secure a sufficient number of charging stations. At present there are four or five at easy distances apart. Eventually there can be little doubt that the hotels on the river will find it financially a good plan to be lighted electrically, and then this power which they have on the premises can be used during the night for charging the storage batteries of launches.

The house which I occupied was at Bray, just below Maidenhead, and each night I took the launch by myself, towing a boat behind, up to the charging station, which was not a mile away. I left it there to be charged during the night, and by breakfast time the launch was outside ready charged, with a sufficient supply to last me the whole day. I may mention that I never exhausted the complete charge of the batteries in my launch during the whole time. I generally went out shortly after breakfast, spent the whole day on the river, very often coming home at eight o'clock, and afterwards taking it up to the charging station in the evening; and certainly 40 miles was not by any means enough to exhaust the supply of electricity on the launch.

The management of the boat is extremely easy, the steering gear and everything about it being perfectly handy. There was no difficulty in crowded locks going in and bringing up alongside of a lock with the greatest ease.

This launch, which was called the "Delta," is 33 feet in length, has a beam of 6 feet, the draught is 15 inches forward and 18 inches at the stern. She is fitted with 44 cells, weighing in all 2,520 lbs. She is steered by a wheel in front within reach of the three handles which are required for working her. The first of these handles is used for putting the current on or off, the second one for putting it to half speed or full speed, and the third for going ahead or astern. The first one is mechanically moved with the others, so that they cannot be moved without first cutting off the current. Fusible cut-outs are inserted in the circuit, so that if the propeller becomes jammed by weeds or by going aground the motor will not burn up. The speed of revolution of the motor, which is coupled direct to the propeller, is 720 revolutions per minute for full speed, and 510 revolutions for half speed. The speed is only between five and six miles an hour for full speed. This is, perhaps, the weak point of this launch. I must say there are times when you are going against a strong current in some parts of the stream where a greater speed would be desirable, and it becomes a little tedious creeping up. It is only in a strong stream that one really finds it a little too slow, and for all ordinary purposes it is quite enough. However, the speed might be very advisedly increased a little, I think, by putting in more accumulators, which the launch could easily carry under the floor without overloading. At present the batteries are all under the seats on each side of the boat, and thus the whole of the space in the boat is clear for passengers. My launch could easily have carried 20 with perfect comfort. It is here that the electric launch has a very great advantage over the steam launch; if we consider the size of the launch, and the number of passengers it will hold, the electric launch is really the cheaper of the two.

I spent a day in making tests of the performance of the launch, which may be of a little interest, though they do not go very far. I started from my house one morning at 11.45. I made allowance as I went through locks for the time that was taken in going through locks and so on, and for other stoppages, and timed everything during the whole way. At one minute past four I was near Hambleton lock, and began the return journey. Stopping an hour at Medmenham Abbey, I reached Bray again at 7.48 P. M. During all this time the exact measurements of the time were taken, and the result was that in the outward journey up stream the average speed was one mile in 11.3 minutes, and on coming down stream the average speed was one mile in 10.2 minutes. The average of these two is 790 feet per minute. On arrival at home the stern was attached to a spring balance connected by a rod with the shore. The pull at full speed was then measured, and found to be 97 lbs., which, although it does not accurately represent the pull when the launch is in movement, still it does so with considerably close approximation. This gives us 1.44 horse-power or 1,074 watts, including electrical losses, slip, and all friction. The pressure of 97 lbs. over 790 feet per minute gives that result. The average pressure at the motor terminals during the run was 78 volts, and the average current was 23 amperes, which gives 1,794 watts expenditure. This gives a total efficiency, including all these losses of slip, friction, and the end thrust of the propeller, and the electrical losses in the motor, at 60 per cent., which seems to me an extremely fair performance in one of the first types of electric launches which have been constructed by these makers.

Electric Lighting by the Government.

Superintendent Powell, of the Treasury Department, has a number of new lighting jobs well under way. Public buildings are being wired as follows:

Augusta, Me., for 600 lights, by the Kennebec Light and Heat Co,

Albany, N. Y., for 900 lights, by the Marr Construction Co.

Buffalo, N. Y., for 900 lights, by the Marr Construction Co.

Baltimore, Md., for 1,500 lights, by the Waterhouse Electric Light Co.

Minneapolis, Minn., for 1,200 lights, by the Northwest Electric Construction Co.

Reading, Pa., for 700 lights, by the Marr Construction Co.

Specifications for lighting the Brooklyn Navy Yard and the steamship "Vermont" will soon be issued by Capt. Bradford, of Bureau of Navigation. The "Vesuvius" and "Petrel" are being equipped with lighting plants by the Thomson-Houston Co.

Some consideration is being given to a plan for lighting the entire building occupied by the State, War and Navy Departments by an isolated plant. For this purpose about 5,000 incandescent lamps would be required. Engineer Geo. W. Baird, of the Navy, is the assistant superintendent of the building, and has the management of all electrical appliances used in it. If this plan is carried out, the White House may be lighted from the same plant.

The Manufacture of the Alloys of Aluminium in the Electric Furnace.

BY MR. J. H. DAGGER.

Deville's method, modified in detail, is still the chief of the chemical processes for the production of aluminium, and is dependent upon the cost of metallic sodium. The greatest value of aluminium is, however, in its alloys, and the successful application of the intense heat of the electric arc to their production on a commercial scale marks a departure in electro-metallurgy of which we cannot over-estimate the importance, rendering it possible to produce rich alloys of this metal at half the cost of any other method, and so widening the field of their application to an extent hitherto unknown. At the works of the Cowles Company, Lockport, N. Y., U. S. A., there are in operation 14 furnaces, the electricity for which is generated by three dynamos, capable of supplying a current of 3,000 to 3,200 amperes, and E. M. F. of 55 to 60 volts. These furnaces can produce 2,500 lbs. of aluminium bronze (10 per cent.) and 1,800 lbs. of ferro-aluminium (10 per cent.) or a total yield of 430 lbs. of contained aluminium per 24 hours. The English works of the company at Milton, Staffordshire, contained 12 furnaces, with a 500 horse-power dynamo, built by Messrs. Crompton, and said to be the largest machine in England, and probably in the world; it furnishes a current of 5,000 to 6,000 amperes, with an E. M. F. of 50 to 60 volts. The production of these works is 2,300 lbs. aluminium bronze (10 per cent.) and 1,800 lbs. ferro-aluminium (10 per cent.) per 24 hours, or 410 lbs. of contained aluminium. The furnaces are rectangular in form, and are of firebrick; into each end is built a cast iron tube, through which the carbon electrodes enter the furnace; each electrode consists of a bundle of nine carbons, each 2¼ inches diameter, attached to a head of cast iron for a ferro-aluminium furnace, and of cast copper for aluminium bronze or alloys containing copper. This head is secured to copper rods, or "leads," which can be readily connected with or disconnected from the flexible cables supplying the current. Each cable is secured to slides travelling on an omnibus bar of copper overhead, and so can be brought into position opposite the furnaces to be used. The electrodes are arranged so that it is possible, by means of a handle and screw, to advance or withdraw them from each other in the furnace. The first furnaces were lined with charcoal, but it was found that the intense heat converted it into graphite, which, being a conductor, not only meant loss of power, but the destruction of the furnace walls. This difficulty has been overcome by soaking the charcoal in lime water, and carefully drying before use; each particle of charcoal is thus coated with insulating shell of lime. Lining the furnace is the first operation; the bottom of the trough is covered with a layer of prepared charcoal, the electrodes are arranged in the furnace, and a "former," a sheet iron box without top or bottom, each end being arched to fit over the electrodes, is inserted; charcoal is then rammed into the space between it and the fire-brick walls. This done, the charge of ore, mixed with coarse charcoal and the metal to be alloyed with the aluminium in form of turnings or granules, is placed inside the iron box, after which this is carefully withdrawn; the space between the electrodes is bridged by some broken pieces of carbon, the charge is covered with coarse charcoal, and the furnace closed by a heavy cast iron cover having a hole in the center for the escape of gases, evolved during the reaction; the cover is luted so as to prevent the entrance of air. The commencing current is about 3,000 amperes, and is gradually increased to 5,000 amperes; a "run" occupies about 1½ hours. The furnace is allowed to cool; the next, ready charged, is connected with the cables, so that the process is a continuous one, the furnaces being successively charged and connected. The crude metal from the furnace is then re melted in an ordinary reverberating furnace, a sample being taken from each run and assayed for aluminium. The nature of the reaction that takes place in the electric furnace is not very easy to ascertain; the conditions are unlike those of any other known; the reduction of the aluminium taking place in absence of air and in presence of an enormous excess of carbon, it may be assumed that, at the intense heat of the electric arc, the ore melts and gives up its oxygen to the carbon:

$$Al_2O_3 + 3C = 3CO + Al_2.$$

In the absence of copper, the liberated aluminium absorbs carbon, and is converted into a carbide of the metal. The escaping gas, which burns at the orifice in the cover is almost entirely composed of CO. The most valuable of the alloys are those with copper. Aluminium bronze has great tensile strength. A bar containing 11.0 per cent. aluminium made by the electric furnace, and tested by the Leeds Forge Company, limited, gave a tensile strain of 57.27 tons, or 128,400 lbs. to the square inch. One containing 7.5 per cent. aluminium, tested by Prof. Unwin, broke under 36.78 tons = 89,743 lbs. to the square inch. In resistance to compression, this alloy equals the best steel; its transverse strength, or rigidity, is about 40 times greater than ordinary brass. Its elastic limit is higher than that of mild steel, and it can be worked at a bright red heat as easily as wrought iron. Its mechanical and physical properties render it useful for every variety of metal work, its high price only having hitherto restricted its use. Its enormous strength and anti-corrodible qualities recommend it as valuable above any other alloy for propeller blades, stern and rudder frames, and for hydraulic and engineering work generally. Above 11 per cent. the alloy becomes brittle, and at 20 per cent. can be powdered readily in a mortar. The addition of small quantities of aluminium lowers the fusing point of iron, and this is utilized in the "Mitis" castings. It insures freedom from blow-holes, increased tensile strength, and high elastic limit. Mr. Keep found that 0.1 per cent. aluminium raised the transverse breaking strength of a ½ inch bar, 12 inches long, from 379 lbs. to 545 lbs., or 44 per per cent., and the resistance to impact from 239 lbs. to 254 lbs., or 6 per cent. The tensile strength of Mitis castings may be as high as 27 tons per square inch, with an elongation of 20 per cent. Another alloy made in the electric furnace is silicon bronze, which, owing to its great strength and tenacity, its resistance to corrosion, combined with high electrical conductivity, is, perhaps, the best metal extant for electric light, telephone and telegraph wires.

The Electrical Execution Law Sustained.

County Judge Day has filed his decision in the Kemmler case. The case was a *habeas corpus* proceeding to test the constitutionality of the electrical execution law of this State. Judge Day decides that the law is constitutional, and remands the prisoner to the custody of Warden Durston of Auburn prison for the execution of the sentence. The decision is long, and begins with a review of the history of the case, and then takes up the question of law at length.

Our readers are generally familiar with the case. Kemmler was convicted of murder and sentenced to be executed on June 24, 1889, by electricity, under the new law of the State of New York.

On June 11, Charles S. Hatch, of Buffalo, attorney for the condemned, applied to Judge Charles C. Dwight of the Supreme Court for a writ of *habeas corpus*, to be returned to Judge S. Edwin Day, County Judge of Cayuga county, alleging that the sentence imposed involved a cruel and unusual punishment in the meaning of the phrase, as used in the constitution. Judge Dwight granted the application. Mr. Bourke Cochran, an eminent lawyer of New York, became associated in the case and secured a review of the law providing for electrical executions, and much interesting testimony was heard. The case was laid before Judge Day last month, and his decision rendered last week at Auburn, N. Y. Mr. Cochran, in an interview, says that Judge Day's decision did not end the matter by any means. Of course, a county judge would not take the responsibility of upsetting a law, he said, and for that reason he was opposed to bringing the case before Judge Day in the beginning. He expected this decision, and will now appeal to the General Term and to the Court of Appeals. This was the programme settled long ago, when it was found necessary to bring the case first before a County Judge.

Sprague Mining Hoist.

We present in this issue of the REVIEW two views of the Sprague improved electric mining hoist, which has recently been built by the Sprague Electric Railway and Motor Company, of New York, for electric mining work.

This is only one of a number of special mining applications already brought out or in process of construction by the Sprague Company. The general arrangement of the different parts can be understood very easily from the views given.

The gears are all boxed in iron cases to protect them from dust or stray stones. At the same time these cases can be quickly removed if occasion should require to reach the working parts. Every part of the machine is designed to give the greatest power with the least weight, and by this means the machine is made quite light and can be easily transported from one part of the mine premises to another.

The qualities of durability, compactness, ease of operation and minimum of wear, so essential in mining work, have been carefully attended to in this machine. The view presented shows that no extra room is taken up by any part of the apparatus. Everything is arranged to fit closely upon the base frame of the hoist.

The speed of the motor is controlled by a regular Sprague switch at one side, by means of which the motor can be made to vary its speed by a single movement of the switch handle. Turning the handle to one division will make the motor run slowly, through two divisions faster, and full number of divisions at full speed, while turning the handle in the opposite direction will give similar rates of speed with opposite direction of rotation.

This electric hoist will fill a long felt want in mining and mill work where a convenient and portable hoist, which can be operated from the lighting circuit already installed, has long been needed.

—— The fire in the Westinghouse factory at Pittsburgh caused a loss of about $70,000 well covered by insurance.

—— The Keystone Construction Company, of Pittsburgh, is putting up an electric plant of 70 arc lights at the American Iron Works of Jones & Laughlins on the South Side.

—— Effingham, Ind., is to be lighted by electricity. At a meeting of the City Council last week it was decided to make a contract for a plant at once. The city is to take 25 arc lights of 2,000 candle-power each.

—— At the next town meeting in Derby, Conn., an effort will be made to have the town assume the responsibility of lighting the streets, allowing the borough an appropriation, the same as it done in the matter of street repairs. This movement has arisen in Derby, and is being favorably discussed by the people, who will not object as long as the outskirts of the town do not ask for more lights than will keep the rate of taxation where it is at present.

—— The Municipal Electric Light Co., of St. Louis, Mo., has become the property of New York capitalists. A reorganization of its board was effected, a new president placed at its head, and, with the question of its financial outlook satisfactorily settled by the sale of the entire bond issue of the company, accompanied by a large stock bonus, it emerges to-day from the chrysalis condition of a local enterprise into the full development of a corporation controlled by two of the largest banking firms of New York City

Albany, N. Y.— The Buffalo Electric and Cable Street Railway Company, formed to operate street surface roads on about 50 miles of streets in the city of Buffalo, filed a certificate of incorporation with the Secretary of State last week. The capital is $1,500,000. The incorporators are Daniel O'Day, Daniel N. Lockwood, James Amm, Gerhard Lang, Henry Altman, Thomas T. Ramsdell, James Adams, J. P. Dudley and George F. Southard of Buffalo, and William L. Elkins and Peter A. B. Weidner of Philadelphia.

Lacombe Carbons.

The large arc carbons for the St Catherine's lighthouse, Isle of Wight, are supplied to the Trinity House authorities by Messrs. Lacombe & Co., of Levallois-Perret, near Paris. These carbons are 2½ inches across. They are of the fluted pattern, designed by Sir James Douglas himself, and are remarkably efficacious in keeping the arc steady and central. The five projecting flutings act, as it were, like five fingers to fix the arc in its place, the flutings supplying the carbon for consumption, and the center acting as the main conductor. The current is a very heavy one, 300 to 400 amperes alternating current, and the light given in the beam is equal to 6,500,000 candles. These fluted carbons are now being considerably employed by the makers and users of search lights, who find their advantage in steadiness. The ordinary Lacombe arc carbons are also much used, among others the lamps at the Paddington installation being supplied with these carbons.

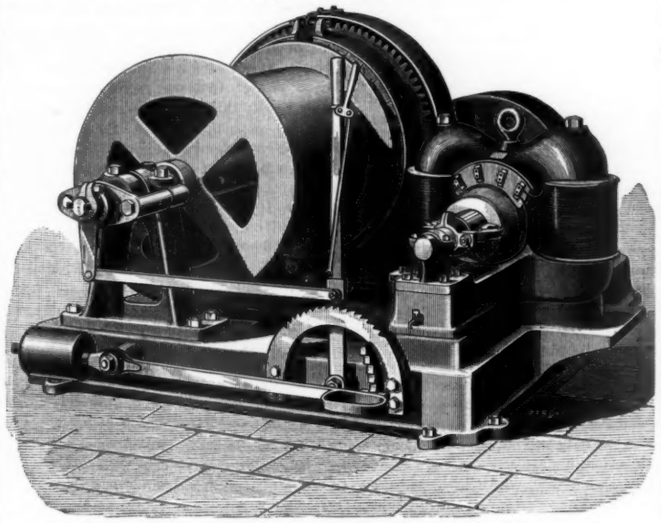

FIG. 1.—SPRAGUE ELECTRIC MINING HOIST.

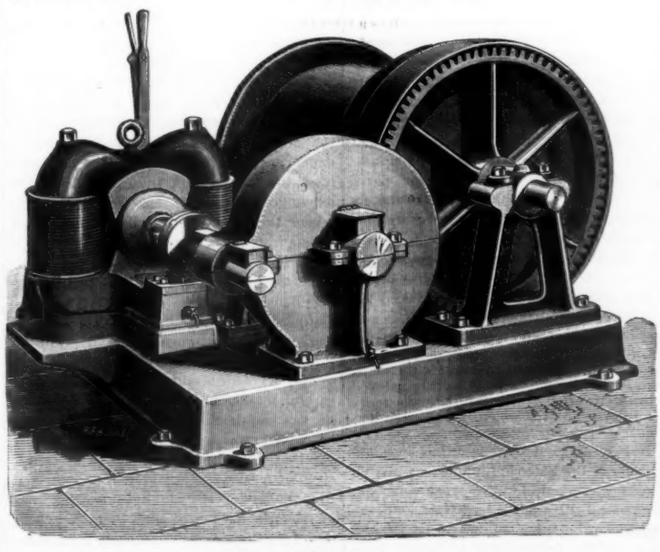

FIG. 2.

Helena, Mont.—Elijah Smith, Prosper W. Smith, John S. Tilney, E. R. Bell and Edward J. Berwind, of New York, and A. G. Horley, P. M. Gallagher and O. F. Goddard, of Montana, have filed articles for the incorporation of the Montana and Wyoming Railroad Company. The object of the corporation is the building of a railroad and a telegraph line from Billings west to and across the Yellowstone River, near the mouth of Clark's Fork; thence along the latter through the Crow reservation to the boundary line between Montana and Wyoming; thence still following the river into Wyoming, and out again at a point on the boundary line near Index Peak, and thence to Cooke City. Capital stock, $2,000,000.

La Grange, Ill.—La Grange Light Company, at La Grange; capital stock, $125,000; incorporators, Samuel A. Moffet, J. L. Hotchkin, R. B. Hotchkin.

Riley, Kan.—The Manhattan Electric Light Company, of Riley County. Directors, J. B. Anderson, George S. Green, E. A. Wharton, Charles C. Garretson, George S. Murphy. Capital stock, $25,000.

Fairbault, Minn.—The Fairbault Consolidated Gas and Electric Company, of Fairbault, with a capital of $100,000, filed articles recently in the office of the Secretary of State. The incorporators are Edward R. Gilman, Wilford G. De Celle, H. S. Cole, George C. Duffie and Harry W. Turner, all of St. Paul.

Chicago, Ill.—The Electrical Industries Publishing Company, of Chicago; to publish periodicals and literature pertaining to electricity; capital stock, $25,000; incorporators, Elmer E. Wood, Emmett L. Powers and George H. Bliss.

Cambridge, Md.—The town council of Cambridge is considering a new project of lighting the streets. Messrs. Johnson and Trump, of the Wilmington City Electric Company, visited Cambridge on Friday last in the interests of their company, which will place bids for putting in an electric lighting plant.

Camden, N. J.—The Chemical Electric Light and Motive Power Company was organized in Camden on Thursday last. The capital stock is $50,000, with $10,000 paid in. The incorporators are Thomas E. Van Dyke, Marion Mayne, Michael Koch, William Williams, John R. McLoughlin, H. Woodruff, all of Philadelphia, and Joseph R. Taylor, of Camden.

Cleveland, Ohio.—The Forest City Wire and Iron Company, Cleveland, $50,000.

Salem, Ohio.—The Salem Electric Railway Company, Salem; capital stock, $100,000.

Warren, Ohio.—The Warren Electric Light and Power Company, Warren; capital stock, $10,000.

Leetonia, Ohio — The Leetonia Electric Light and Power Company, Leetonia; capital stock, $10,000.

Detroit, Mich.—The Detroit Electric Light and Power Company, of Detroit; capital stock, $300,000.

Cleveland, O.—The Cleveland Electric Light Company, of Cleveland, increase of capital stock from $100,000 to $200,000.

Huntsville, Ala.—G. A. Lippencott and others having obtained a charter, will put up a telephone line from Huntsville to Guntersville via Brownsboro and other towns in the State.

Junction City, Kan.—The Junction City and Fort Riley Rapid Transit Railway Company; capital stock, $50,000. The purpose is to construct a street railway line from Junction City to Fort Riley, to be operated by electric motor. The directors are John Davidson, George E. Harvey, John K. Wright, W. W. Cook, C. L. Linton, J. R. McClure, C. H. Frott, G. W. McKnight, J. F. Streeter, all of Geary County.

Kearney, Neb.—Articles of incorporation have been filed of the Central Nebraska Phonograph Company, with an authorized capital of $625,000, with power to increase it to $1,000,000. Kearney will be the headquarters of the new concern. The incorporators are A. Benson, H. H. Benson, G. F. Wright, G. R. Sherwood and F. Y. Robertson. The following will constitute the board of directors of the company: A. A. Benson, F. Y. Robertson, G. R. Sherwood, S. M. Nevius, C. H. Elmendorf, N. A. Baker and H. Fred Wiley.

Syracuse, N. Y.—The Eastwood Heights Street Railway Company has been incorporated with a capital stock of $30,000. The incorporators are Nelson R. Williams, R. Nelson Gere, Gideon N. Caleb, George B. Leonard, George B. Warner, Charles Hudson, William J. Hart, Irving N. Gere, Morey S. Williams, L. A. Williams and four others. N. R. Williams has been elected president, R. Nelson Gere, vice-president, and George B. Leonard secretary and treasurer. The new road will be operated by electricity and extend from Burnet avenue, through the property of the Central City Land Company to East Syracuse. It is agreed to have a part of the road ready for use within 90 days.

East Saginaw.—The organization has been perfected of the Ohio and Michigan Anglo-American Storage Battery Company, which has filed articles of association in the office of the Secretary of State at Lansing. The shareholders are George F. Cross, E. Hallenbeck, Sanford Meller, W. C. McCline, J. H. Booth, W. E. Allington, W. H. Curtiss, H. L. Brintnall, John S. Porter and R. M. Randall, and the capital stock is $1,500,000, divided into 150,000 shares of $10 each. It has a lease of 30 years' life and is authorized to transact business in Michigan and Ohio with the main office in East Saginaw. The principal business for which the company is formed is to buy, sell and deal in storage batteries and other electrical devices, and to furnish power, light and electricity for general uses. The company has secured the Sorley system franchise for the States named, the patents of which are owned in New York.

ELECTRICAL REVIEW

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GEO. WORTHINGTON, - Editor.
CHARLES W. PRICE, - Associate Editor.
T. J. McTIGHE, Electrician and Manager Patent Bureau.

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☞ No attention will be paid to communications without the *name and address of the writer.*

We invite correspondence from Electricians, Inventors, and the Telegraph and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

NEW YORK, OCT. 19, 1889.

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Prof. Barker, of Wesleyan University, is looking up points on electrical and mechanical engineering at Cornell, with an idea of starting the engineering courses in that institution. Ex-President Hayes, one of its trustees, has given a large sum of money for that purpose.

At the time when railroads were first introduced into Germany, the Royal College of Physicians in Bavaria signed and issued a protest against the new mode of travel. "Locomotion," it declared, "by means of any kind of steam-engine should be prohibited in the interest of public health. Rapid change of place cannot fail to produce among travelers the mental malady called delirum fusiosum." We laugh at these ideas now, but some of the reasons presented at this day for the non-use of electricity are about on a par with those issued by the learned German physicians of many years ago.

The famous Pan-Electric suit has been advanced to the General Term of the District Court in Washington, D. C., and will probably be taken up during the Winter.

The Electric Club opens its season of lectures and meetings Thursday night of this week. Dr. Leonard Waldo, formerly of Yale, will address the Club. There should be a large attendance.

The annual meeting of the Association of Railway Telegraph Superintendents will be held in Washington, D.C., on the 16th inst. This meeting was appointed to be held in Atlanta, Ga., but upon request of the Northwestern members the place was changed.

The Naval Observatory has just received notification that it has been awarded a Grand Prize for its exhibit of electric time signal apparatus at the Paris Exposition, and Mr. Wm. F. Gardner, who put up and managed the apparatus at the Exposition, received a gold medal for his inventions relating to it.

London contractors will soon be afforded an opportunity of lighting the Houses of Parliament by electricity. The small existing installation has been very successful in the hands of the resident engineer, but the treasury is unwilling to sanction the large expenditure necessary for the lighting of the whole building, and propose to call in some outside company to supply it at a fixed price. It is not considered likely that there will be much competition for the contract.

When you can buy zinc, pound for pound, as cheaply as you can coal—when a three horse power machine can be made to do more work with two horse power applied—when a locomotive will run up hill more readily and at less cost than it will down hill—when rivers run up stream, and when somebody invents a successful perpetual self-moving machine, then in both electricity and mechanics you will be able to get more out of your battery or engine than you put in, more sugar out of a beet than nature placed there, and more suckers out of a pond than the original number of eggs dropped by the mother fish.

Prof. Arthur Shuster states that he has, during the last two years, investigated the distribution of potential in the neighborhood of the negative pole of discharge of electricity through rarefied gases. Knowing the rate of fall of potential, it can be determined whether there is any bodily electrification in any part of the negative glow. It was found that the cathode is surrounded by an atmosphere of positively-electrified gaseous particles extending to the outer edge of the so-called dark space. According to the author's views, this atmosphere corresponds to the polarized layer adjoining the negative electrode in an electrolyte. The cause of the sudden difference in luminosity between the dark space and the negative glow has also been investigated, and it has been found that the negative particles projected from the cathode pass unhindered through the dark space, while their velocity is quickly reduced in the glow proper, the translatory energy being thus changed into energy of vibration.

In the years gone by, the anxious general manager of the Electric Light Company, of Wayback, came up to town every now and then to be thrilled to the backbone with the magnificent display of big incandescent lamps which enthusiastic inventors were putting on the market. Electric light men, who attended the convention of the National Electric Light Association in Detroit several years ago, will remember the wonderful 200 candle-power lamp working at one watt to the candle (?). For some reason or other we do not see many big lamps in use; in fact they are scarcely a factor in the electric lighting business of to-day. It has remained for the present month to bring forth the biggest incandescence on record, so far as we know. We read of the recent meeting of the British Association being illuminated by a "Sunbeam" incandescent lamp of 3,000 candle-power. Unfortunately no data is given as to the life, efficiency or dimensions of this monster lamp which, at the same efficiency as the average lamp used in this country, would absorb over 12 electrical horse-power.

THE HIGH TENSION WIRE QUESTION.

The injury to human life in large cities, but especially in New York, from electric light wires, is a subject which should receive immediate attention on the part of all those who wish for the prosperity of the electric light industry, for the reason that in the first place there are more accidents than there should be, and in the second place, a large portion of the electric light business is rapidly being misrepresented before the general public, which is becoming prejudiced against it.

There is no more use in saying that in all cases electric light central station companies have employed every precaution to insure safety to human life than there is to try and disprove that many companies have and will continue to use every precaution regardless of expense. The question of the hour is, what to do with the condition of things as it exists now? Insulated wires, like everything else in this world, become dilapidated in time. A vast number of those hanging over the streets and housetops of New York to-day are in bad condition; so are many telegraph, telephone and all sorts of iron wires. It is wasting valuable time to try and find out which are the worst. It is equally foolish to cut wires down by the wholesale. Undoubtedly his honor, Mayor Grant, is much irritated by the apparent lack of progress which is being made, but it is as useless for him to tell Electrical Expert Wheeler that he is responsible for this loss of life as it would be for that at present much over-worked gentleman to try to personally inspect every wire in this great city.

Our Board of Electrical Control has, unfortunately, been so formed as not to win the confidence of the electrical interests, nor for that matter of the public in general. If this Board were composed of men of experience and knowledge in electrical work, and equipped with every facility for the proper inspection of wires and enforcement of comprehensive rules, the risks could be greatly lessened. There will always be some danger. As was well said at the last Electric Light Convention: "Anything that has power will kill. Anything that has not power is of no use to man." Yet this hazard can easily be reduced to a minimum, and the electric light companies, we know, are the first ones who desire it.

We do not think the burial of the strong current wires will decrease the danger. It is probable that the remedy that would come the nearest to removing the element of danger, considering that alone, is the burial of all the wires except those carrying high tension currents. Let these remain in sight where their condition could be easily and constantly inspected. This would reduce the overhead wires probably 80 per cent., and the likelihood of the numberless telephone, telegraph, messenger call, fire alarm wires, etc., coming in contact with dangerous electric current and distributing it in unexpected places will disappear.

The whole question is one deserving of careful, intelligent consideration, and while the two sad deaths of linemen last week, one of which was particularly horrible, has greatly stirred up the public mind in this city, we trust wise counsel will prevail, and the suppliers of electric light and the users of electric light will find that they both desire the same end—the electric light at the minimum of danger and of expense.

Our contemporary, *Electrical Engineer* (London), says that English electrical manufacturers have been striving with their might to get all the work they could do, and now we suppose they will have to strive a little harder still. The Westinghouse Company have decided to open branch works in England, to be situated in Yorkroad adjoining the Westinghouse Air Brake Works, London. Mr. H. M. Byllesby, general manager of the Westinghouse Electrical Company, has come over with a corps of electrical experts, and will superintend the construction and equipment of the works, and to make arrangements for the introduction of Westinghouse apparatus. The company has been registered in England, and has not actual connection with the American company.

JUDGE DAY'S DECISION.

Although in electrical circles there is a general feeling of regret that Judge Day should have handed down a decision in the Kemmler case to the effect that execution by electricity in this State is not unconstitutional, yet it cannot be said that the reasons he gives for doing so are unmanly nor illogical. His Honor said: "The judicial power, in declaring the act of Legislature void, does not proceed upon the theory that it has superiority over the Legislature, or that laws, to be valid, must conform to its notions of wisdom and propriety. The duty upon the courts to decide, when the question is presented to them, whether an act, the constitutionality whereof is assailed, transgresses the inhibitions of the fundamental law. * * * * All authorities are, I believe, to the effect that in a doubtful case a statute assailed as unconstitutional should not be judicially declared to be so. * * * When a constitutional question arises before a single magistrate he should only declare the law invalid when his duty so to do is entirely clear, and that in a case of grave import he is justified, if not required, to leave the matter to the deliberations of the appellate tribunals. * * * * Before the statute can rightly be abrogated there should be judicial knowledge that the punishment therein provided is cruel and unusual." It will thus be seen that the criminal Kemmler is in no immediate danger of electrolethe nor the noble science of electricity of being prostituted to this ignoble use. We venture to assert that before the matter can be properly brought before the appellate court the whole question will have been brought in its true light before the State Legislature and the obnoxious law repealed. In the meantime it is a pity that the especial criminal in question should have been kept so long from his just deserts.

First Meeting of the Electric Club for Lecture Season of 1889-90.

The following notice has been sent to the members of the Electric Club, and announces a meeting for Thursday evening of this week:

The first regular monthly meeting of the Electric Club for the season will be held at the Club House, 17 East 22d street, Thursday, October 17th, at 8 o'clock P. M.

The address of the evening will be delivered by Dr. Leonard Waldo. "Some Casual Ideals Concerning the Requirements, Possibilities and Risks of the Electric Club" will be his topic.

The meeting will partake largely of the nature of a reunion, and, in addition to the address, the committee on entertainment will provide special entertainment for the evening, and a free supper will be served after adjournment. Members who expect to be present at dinner, which will continue from 6 to 8 o'clock, should notify the clerk at the Club House.

Lieutenant V. L. Cottman, of the Navy, who has been detached from the Nautical Schoolship "St. Mary's" and detailed as secretary of the International Marine Congress, which is to meet at Washington on Wednesday, received a just compliment from Secretary Tracy, says the New York *Tribune*. Lieutenant Cottman was for three years in charge of the branch hydrographic office in this city, and his reports received the highest commendation from shipowners and shipmasters; hence, when Secretary Tracy commended him to the chairman of the American delegation to the Marine Conference as one "eminently qualified because of his familiar acquaintance, from experience, with the maritime world," he echoed the sentiment of the New York shipping people. Lieutenant Cottman is well informed in electrical work and has many friends among the scientific men in this profession who will congratulate him on deserved recognition.

The Columbus Telephone Exchange, Columbus, Ga., has been transferred from the third district of the Southern Bell Telephone Company with headquarters at Atlanta, to the second district with headquarters at Charleston, S. C.

ELECTRICAL NEWS.

Washington, Boston and Chicago.

OUR WASHINGTON LETTER.

Electric Decoration.—The most unique decoration, in this much decorated city, is a masonic emblem on the building of the late Norris Peters, the photo-lithographer of the Patent Office. It is composed of 122 sixteen candle-power Edison lamps, arranged in the form of a square and compass, with a large letter "G" in the space enclosed by the arms of the square and compass. It was placed on the building in honor of the visiting Knights Templar. The work was done by Mr. C. W. Messner, a Western man, who has some time since located in our city, and has built up quite a large house-wiring and general electrical business.

The Chesapeake and Potomac Telephone People have a way of keeping their eyes wide open, and looking carefully after the interests of their patrons, as is evinced by the following: When the overhead wire question was being agitated in Congress, they foresaw what would be the result, and anticipating contrary legislation, quickly strung a large number of wires for the convenience of their patrons, and are now able to take a large number of additional subscribers without materially taxing their lines.

A Law Without a Penalty.—Wiring in the District is attended with difficulty and annoyance on account of the law with regard to overhead lines. A lineman on descending a pole after making repairs, can generally expect to find a policeman at the foot. But it is not generally known that Congress, in making this wonderful law, has wisely neglected to provide a penalty, and so when the men are "pulled" there is no punishment, and what to do with them is the question. Measures will doubtless be taken at the coming session to have the law modified or repealed.

New Plant.—The little village of Eckington, at the terminus of the Eckington Electric R. R., is about to introduce a new system of lighting. The Westinghouse alternating system will be used. The dynamos will be located in the power house of the electric railroad, and current will be distributed to converters on the sides of the houses. The plant is being installed under the direction of Mr. M. Lowd, of Boston, and the house wiring is being done by Mr. C. W. Messner, of this city. When completed the plant will be up to the standard of the electric road, *i. e.*, one of the finest and most complete in the country.

Washington Work.—Persons in other cities seem to have an idea that work in Washington is dead, and that were it not that this is the Capital of the nation, the city would be only of secondary importance. This is clearly a mistake. Look at our electric work, for instance. Our electric railway has no superior in the world; we don't burn out armatures going up hill and give people the impression that electric traction is a failure, as has recently been done in our nearest neighboring cities. Our lighting plants leave nothing better to be desired. We have several electric construction companies which are "kept on the jump" to keep up with orders. Many inventions of importance emanate from our city, and no credit given us therefor, and I propose to show in future, if possible, that this is a fact.

Once More.—"The National Street Car Motor Company" has been incorporated at Alexandria, Va., with a capital stock of $500,000. They will, as their name indicates, manufacture motors, trucks, etc., for street cars.

Notes.—I am informed that bids will soon be called for by the Registrar of the Treasury, for an electric motor designed to supersede steam power in cutting and cancelling notes.

The arc lights in the White House Grounds were lighted recently upon the occasion of a reception by the President to the visiting Knights. G. E. M.

Washington, D. C., Oct. 12.

OUR BOSTON LETTER.

The Electric Exchange.—The regular quarterly meeting of the New England Electric Exchange will be held this afternoon at the Boston Electric Club rooms, 7 Park Square. The success of this organization warrants the prediction that similar work will be undertaken in various parts of the country.

A Good Season's Showing.—During the past summer Messrs. Howard & Stone, the New England agents of the "C. & C." Motor Company, have ministered to the wants of sweltering humanity in Boston by supplying to it cool breezes by the "C. & C." fan outfits, of which 43 were sold in the city proper during the heated term. Since the "C. & C." Company brought out its new pattern of large capacity motors, the New England agency has done its part in installing them. A 10 horse-power motor has been sold to the Edison Illuminating Company, whose dynamo room it ventilates.

Another of the same capacity runs a machine shop on Sudbury street. Smith Brothers, on Washington street, replaced a hot air engine of eight h. p. by a four h. p. "C. & C." motor for running grinders, and the change has been a great improvement. Other new installations of "C. & C." in Boston are one of three h. p. for engraving; another three h. p. on coffee mills; a two h. p. motor on tortoise shell work, replacing an oil engine; a two h. p. on printing presses, and numerous small sizes, scattered through the city. Messrs. Howard & Stone are also doing a large business in ventilation contracts, and Boston's oldest club, the Somerset, has just been fitted out with a ventilation plant by them.

Off For Minneapolis.—Quite a number of Bostonians, prominent in the street railway business, are intending to be present at the convention of the American Street Railway Association, at the West Hotel, Minneapolis, beginning October 16th. Among those who will probably be there are Captain Eugene Griffin, of the Thomson-Houston Company; Mr. G. H. Monks, of the West End Company; Mr. E. P. Shaw, of the Newburyport Car Works; President Breed, of the Lynn and Boston road, and Mr. R. B. Ferguson, of the Thomson-Houston Company. Mr. R. T. White is a member of a party which started last night over the Hoosac Tunnel line. Mr. White carries with him a complete line of samples of his Eureka construction street railway supplies, which will attract favorable attention of street railway people, especially those already using or contemplating using electric power.

To be Seen in New York.—The Evans Friction Cone Company have an exhibit at the American Institute Fair in New York which is the drawing card in its section. Mr. Henry J. Conant, of the Evans Company, left for New York yesterday and will be at the Fair during the week to explain the workings of the apparatus. The Pettee Machine Company, of Newton Upper Falls, is putting in one of the Evans Friction Drives for the the new electric lighting plant at the works.

Underground Work at Narragansett Pier.—A contract for underground work has just been completed at Narragansett Pier, R.I., by the Wright Electrical Engineering Company. A conduit 600 feet in length has been laid from the point where the pole line ends to the center of distribution, which is in a private residence called Dunmere, the country home of a wealthy resident of New York. Lamps of 32 candle-power have been placed on ornamental iron fixtures at the entrance gates and posts on either side of the driveway, also in the brownstone terraces around the mansion, and several lights are scattered through the grounds on ornamental iron lamp-posts. In addition there are fifty 16 candle-power lamps in the house itself, 20 in the bowling alleys and two in the stable. No wires show at any point on the grounds or on the poles and fixtures. Okonite wire is used throughout Current is supplied by the Narragansett Pier Electric Light Company, of which Mr. C. R. Fish is manager, and the operation of the entire plant has gone on without a hitch of any kind. The underground work is a duplicate of Mr. Alex. P. Wright's work at Springfield, Mass., which has now been in practical use over two years without trouble of any sort. The primary wires, with a difference of potential of 1,000 volts, are buried as well as the secondary wires. The Wright Company has also done considerable inside work at the Pier this season, reviving several hotels and changing over the alternating current switchboard at the station to conform with the new insurance tariff issued by the New England Insurance Exchange.

Dynamo Efficiency.—The Standard Electric Company has running at its St. Johnsbury, Vt., shops a dynamo which supplies current to 500 16 candle power lamps with an expenditure of 36½ horse-power. Naturally pleasing for the Standard Company. Mr. Milbank reports sales of lighting plants recently to the Henry C. Bowen Company, of Providence; the Boston and Maine Railway Machine Shops at Lindenville, Vt., and Hollingsworth & Vose, East Walpole, Mass.

An Interesting Power Plant.—The Holtzer Cabot Company are about installing a 10 horse power Eddy motor in the new Auchmuty building on Kingston street. It will be used in running a large pump which is to deliver 350 gallons of water per minute. The building is on made land and the excavations are below tide water level, so some arrangement is necessary for the removal of the water. A large drainage reservoir is placed under the building and a float will automatically start and stop the motor and pump, so that no supervision whatever will be necessary. Mr. C. E. Bibber, of the H.-C. Company, who recently started on a business trip to the Pacific coast, is meeting with success on the way and sending back orders already.

Removal.—The Gould & Watson Company, dealing in molded micas, have moved to the new building, 35 Hartford street, between Purchase and High streets, where large and well-lighted quarters have been secured.

Boston, Oct. 14, 1889. T. W. S.

OUR CHICAGO LETTER.

Electric Power.—The "C. & C." Electric Motor Company have lately installed for the Chicago Printing Company two of their motors, one of 15 and one of 5 horse power. The machinery operated by the 15 horse power motor includes 17 cylinder presses, 14 jobbers, 5 paper cutters, 3 folding machines and 6 wire stitching machines. The 5 horse power motor is used exclusively to operate the elevator, and increases the speed 20 per cent. over steam power previously used. The saving in the operation of this plant over the old steam plant is something wonderful. It cost to run the steam plant something like $290 per month, which was 40 horse power. The total expense of operating the present plant is $136, thus making a saving of $154 per month. In a letter from E. G. Schubbert, vice-president and superintendent of the Chicago Printing Company, to the "C. & C." Company, he recommends electric power for printing offices, and pronounces it a success for economy, efficiency, reliability and convenience.

Electrical Supply Sales.—The Central Electric Company report business good, their wire sales lately made amounting to 130 miles. The company have a number of new novelties, prominent among which is a new patent windlass for raising and lowering arc lights. The Electrical Supply Company report a good business and many large sales.

Installations.—Mr. J. H. Reid, western manager of the Mather Electric Co., reports the following late sales: Zangerle Manufacturing Co., Chicago, 200 lights; Watersmeet Lumber Co., Watersmeet, Mich., 50 lights; Imperial Roller Mill, Duluth, Minn., 250 lights; A. H. Bode, Minneapolis, Minn., 200 lights; Gilbert Paper Co., Menasha, Wis., 100 lights (second installation); Michigan Soldiers' Home, 1,300 lights (second installation); Union Coal Storage Co., 150 lights; Denver Tramway Co., Denver, Colo., 250 lights; Denver Republican Pub. Co., Denver, Colo., 300 lights; C. V. N. Kittridge, Denver, Colo., 600 lights; Endicott building, St. Paul, 1,300 lights, two 650 light machines, the plant having a capacity of 2,000 lights. The plant at the Denver Tramway Co. runs without intermission day and night throughout the year. The following sales of motors have been made by the above company lately: Pioneer Press, St. Paul, Minn, three motors 7½, 5 and 2½ horse-power; these will be used in running presses and elevators for carrying forms to the tenth floor. D. H. Valentine, St. Paul, Minn., one five horse power for operating printing presses.

Electric Railways.—The railway department of the Thomson-Houston Company has closed a contract with the Union Depot Street Railway Company to furnish 30 cars. The generators will have a capacity of 500 horse-power. The power plant and station will be built by the Union Depot Company and the electric construction will be by the Thomson-Houston Company. The above company has also closed contracts with the Milwaukee Cable Company for 12 cars with generators of 200 horse-power capacity and an increase of six cars and 160 horse-power for the Des Moines Street Railway Company, of Des Moines, Iowa, making the second increase for this company within one year. Large contracts have been closed at Denver, Colo., and San Jose, Cal.

Topeka, Kansas.—The North Topeka Electric Light and Power Company are about to increase their plant. One high tension arc machine will be added at once. The contract for wiring the State House has been awarded the Kansas Electric Company of that city.

Kansas City, Mo.—The Thomson-Houston Company have received an order for four more cars and three miles of track for the Armourdale line. This road has been in operation only a short time, and an early increase looks very favorable for the road as well as for the Thomson-Houston Company. The Edison Electric Light and Power Company reports business on the increase; the company are rapidly nearing their present capacity. This certainly must be encouraging to Superintendent G. W. Hart.

Personal.—The vacancy made by the resignation of F. W. Horne, manager of the Excelsior Company, has been filled by the appointment of Mr. S. W. Trawick.—C. H. Cone has returned from a prosperous southern trip in the interests of the Knapp Electric Works.—G. A. McKinlock returned today from a trip through the South.

Arc Light Installations.—The Excelsior Electric Company report the following recent sales: Thomas Ridge, Kansas City, Mo., 30 lights; St. Charles Car Co., St. Charles, Mo., 30 lights; Rice Lake Lumber Company, 30 lights; J. B. Garland, Bucodo, Wash. Ter., 15 lights; Knapp-Stout Company, Menomee, Wis., increase of 60 lights. The above company has also closed a contract with the Williams Engine Company, of Beloit, Wis., for a 300-light incandescent machine. D. B. D.

Chicago, Oct. 12, 1889.

—— The Electric Light Co. at Woburn has put into their plant a Thomson-Houston welding machine.

PERSONAL.

Mr. W. D. MacQuesten, the electrical engineer, has removed from No. 2 West 14th street to No. 15 Cortlandt street, New York. Mr. MacQuesten is an experienced electrical worker and is now prepared to give technical advice as to the electric lighting system best adopted to the necessities of each case or to supervise installations.

Capt. Eugene Griffin has finally resigned from the army to continue his engagement with the Thomson-Houston Company. He probably considers that $10,000 a year from a private corporation is better than a prospective promotion in the service of the country. These instances of valuable men being led away from government offices to private enterprises by high salaries are becoming very common.

Col. Gardiner C. Sims and Mr. H. N. Fenner were New York visitors last week, having deserted the city of Providence and State of Rhode Island for a few days. Mr. Fenner is treasurer of the New England Butt Company, and is kept so busy supplying wire manufacturers with braiding and other similar machinery that his New York friends rarely see him. Col. Sims claims that it is not his new son and heir that keeps him awake nights, but the effort to study out a plan to supply his engines fast enough to satisfy the demand from the electric lighting public.

The departure from this city, writes our Washington correspondent, of Captain T. W. Symons, who has been promoted to a more important army station in Portland, Oregon, is a matter of much regret to persons interested in electric line construction in the District. He has given much intelligent study to the many different wire problems that have arisen during his term of service here, and has performed a vexatious task with efficiency, fairness and courtesy. There are frequent rumors that Major Raymond is desirous of being transferred to a more congenial field. Should this change follow the loss of Captain Symons, electric interests will be liable to some embarrassments until the successors of these officers have time to get an understanding of the questions involved in the business, and it will not be a trifling matter for any new man to become as familiar with the subject as are Major Raymond and Capt. Symons.

Electric Lights Out in New York City.

Pending the hearing of their injunction cases against the Board of Electrical Control, the Brush and United States Companies agreed to turn off their lights in New York City Monday night. The city was most dismal looking as a result, as over 3,000 arc lights went out, and there was no gas to replace them. Extra police were required.

Judge Brewer, of the United States Circuit Court at St. Joseph, Mo., has rendered a decision that Prof. A. G. Bell is the original and sole inventor of the telephone, in the case of the American Bell Telephone Company and the Missouri & Kansas Telephone Company against the Johnson County Telephone Company. The latter company has been running a line of its own and refusing to pay the Bell Company a royalty on its patents, which it was alleged the Johnson Company was infringing. In accordance with Judge Brewer's decision the latter company has agreed to close its business, deliver its plant to the Bell Company, and pay nominal damages. This is probably the last effort of the telephone infringer.

—— The new electric light station at Watertown, Mass., is fast nearing completion. The outside work is finished and the inside is well advanced. Work has been commenced on the iron work of the new gasometer and will be rapidly pushed.

—— The new plant of the Electric Light and Power Company, at Peoria, Ills., with its equipment complete, will cost considerably over $100,000. It has been generally stated at a little over half that sum; but one contract on the building alone is $52,000.

—— The annual meeting of the Schuyler Electric Company was held at Middletown, Conn., last week, and the following officers were elected: President, Seth H. Butler; vice-president, Charles E. Dustin; treasurer, Joseph T. Elliott; secretary, D. J. Glazier.

Telephonic News

⁂ A telephone line is being put up between St. Petersburg and Moscow.

⁂ The Pacific Bell Telephone Company has reorganized, under the name of the Pacific Telephone and Telegraph Company, with a capital stock of $5,000,000.

⁂ Telephonic communication is being steadily developed in Australia, the receipts having increased largely in Victoria during the past 12 months. The first long-distance line between Victoria and Geelong is now nearly ready for opening.

⁂ Experiments have recently been made by the authorities at the Imperial Dockyard, Wilhelmshaven, with the object of establishing telephonic communication between divers and the vessels to which they belong. The experiments yielded very good results. Whether the arrangement is of practical importance, further experiments will show.

⁂ A new tariff of charges for using the telephone has been introduced by the administration of Swedish telephones, whereby the charge is fixed at 4½d. for three minutes conversation where the distance is under 100 miles, and 6½d. for distances above, with 1½d. for each additional minute. It has been found that the limit of three minutes is preferable to five, hitherto allowed.

⁂ During the suspense in connection with the Maybrick trial, the telephone at Darwen was frequently used with a view to ascertain the verdict. At one of the offices in the town the office boy was asked to speak through the telephone to Mr. So-and-So, and ask if the verdict had been given. The boy did so. The party replied, "The verdict is not yet given; the judge is still summing up." The boy delivered the following: "Please, sir, they say the verdict is not known, but the judge is doing his sums yet."

⁂ When the telephone was first introduced into Minneapolis 10 years ago, the company had less than 100 subscribers and one switchboard was all that was necessary to accommodate its patrons. Now the entire south side of the fourth floor of the city hall is covered with switchboards and nearly 1,700 subscribers are now on the list. The space now occupied by the company is entirely inadequate and Manager Christie says that the company will have to seek larger quarters. The rooms selected are on the upper floors of the new building on Fourth street side adjoining the Nicollet national bank. The rooms to be occupied by the company are being finished to suit its convenience, and all the wires, switches, etc., will be in position by January 1, 1890.

⁂ The Edison Phonograph Toy Manufacturing Company, of Boston, has issued a circular to stockholders, in which it is states that new contracts have been made with Mr. Edison, by which the company acquires "the exclusive right to use in dolls and toy figures, in all countries of the world, and for all time of Mr. Edison's inventions, whether hitherto made or to be made during the coming five years from the date of the contracts." The old contracts for sale of the dolls abroad have been cancelled. "The company has further made contracts with responsible selling agents in France, South America, Canada and the Pacific coast of the United States by which these agents agree to purchase of the company on an average about 100,000 dolls per year for a period of five years." Mr. Edison is to manufacture all the talking machines and can now make 500 a day. The company expects to deliver completed dolls in time for the holiday trade.

The English Post Office Competing with the Telephone Companies.

The following important notice has been issued by England's Postmaster-General:

NOTICE.

On and after the 1st October the telephone wires which have been provided by the post office between the following towns in South Wales may be used by the public on payment of a fee of 6d. for a conversation not exceeding three minutes:

Cardiff,	Pontypool,
Barry Dock,	Talywain,
Newport,	Briton Ferry,
Alexandra Dock,	Swansea.

Any person joining the telephone exchange of the department in one of these towns can use the wires to the other towns from his own office. Other persons can do so on going to an office of the department, where a silence-box has been provided. For instance, such a person in Newport desiring to communicate with a firm in Cardiff, whose office is connected with the postal telephone exchange in that town, would go to the head post office in Newport, where, on payment of the prescribed fee, he would be placed in telephonic communication with the office of his correspondent; or, if his correspondent's office was not so connected, he could direct him to attend at one of the post office silence-boxes in Cardiff punctually at a particular time, and there carry on the conversation.

The local telephone wires in the above mentioned towns may also be used by the public, the fee for a conversation of not more than three minutes within one and the same town being 3d. Under this arrangement a person whose office is not connected with the local telephone exchange can at any time hold telephonic communication with a person whose office is so connected on going to one of the offices of the department, where a silence box has been provided for the purpose.

The limit of three minutes may be exceeded on payment of 6d. or 3d., as the case may be, for each additional period of three minutes or less. Our esteemed contemporary, *The Telephone*, comments as follows on the situation:

"So the post office are entering the field after all as competitors of the telephone companies. Of course, they have a perfect right to do so, but whether this is quite fair is another question. The companies pay the post office 10 per cent. of their gross income, and are hereby heavily handicapped from the beginning. We do not think that the companies need be afraid of the competition if we judge from what has taken place at Hull. There the local authorities requested the National Telephone Company to open an exchange, so as to be able to make use of the trunk wires of the company, and we believe that there are already nearly as many subscribers to the company's system as to that of the post office. In other places in the west of England the Western Counties Telephone Company has completely ousted the post office, so that we feel sure that the Postmaster-General's notice is simply meant as a sort of alarm shot into the enemy's camp. Of course, there is only one satisfactory and possible solution of the difficulty, and that is, the government must buy out the telephone companies. The longer they hesitate, the worse for the public!"

The Australian Doctors and the Telephone.

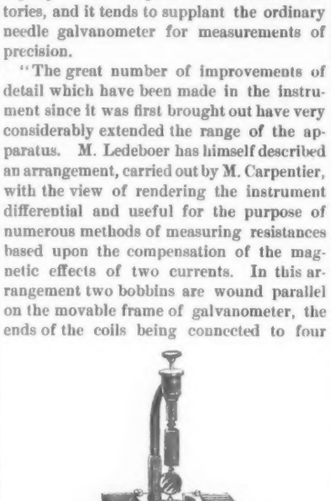
Dr. Ellison wrote to the *Register* last week complaining that in the July number of the "Telephone Exchanges," published by the government, there was given a piece of gratuitous advertising by adding to the names of medical subscribers to the telephone exchange the hours of consultation. Dr. A. A. Hamilton has called to explain that he wrote to the Postmaster-General with the concurrence of all but two members of the medical profession in Adelaide, to ask whether the hours of consultation might be given in the list, as he considered that it would not only be a convenience to the profession, but would prevent the telephone exchange being rung up needlessly if the people knew at what hours they would be able to find the doctors at home. The telephone department, upon being supplied with the information, published it. Dr. Hamilton said he had no idea that the entries would be regarded as advertisements.—*The Telephone, London.*

Deprez-d'Arsonval Differential Galvanometer.

We are indebted to our esteemed contemporary, the London *Electrical Review*, for the following description:

"The value of the Deprez-d'Arsonval galvanometer is beyond dispute. Thanks to its dead-beat action, which allows of rapid reading, and to the slight influence which neighboring bodies exercise on it, it has rapidly taken a first place in industrial laboratories, and it tends to supplant the ordinary needle galvanometer for measurements of precision.

"The great number of improvements of detail which have been made in the instrument since it was first brought out have very considerably extended the range of the apparatus. M. Ledeboer has himself described an arrangement, carried out by M. Carpentier, with the view of rendering the instrument differential and useful for the purpose of numerous methods of measuring resistances based upon the compensation of the magnetic effects of two currents. In this arrangement two bobbins are wound parallel on the movable frame of galvanometer, the ends of the coils being connected to four



THE DEPREZ-D'ARSONVAL DIFFERENTIAL GALVANOMETER.

terminals through a double bifilar suspension.

"The construction of such an instrument is found to be difficult, for though it is easy to give to the circuit of the two bobbins equal resistances and the same number of turns, it is extremely difficult to produce exact equilibrium by the differential effect of two currents acting in a magnetic field the lines of force of which are very irregularly distributed.

"It is true that the two bobbins can be wound with a double wire as is often done in the case of differential electro-magnets, but the necessity of reducing as much as possible the size of the movable frame prevents the employment of a thick covering to the wire, and there is a consequent liability of contacts between the two wires.

"In order to facilitate the construction and the adjustment of the instrument, M. Eric Gérard arms the poles of the magnet with two armatures which, instead of being fixed as in the ordinary apparatus, are movable about vertical hinges, and can be approached or withdrawn obliquely to a central bar of soft iron by means of two screws of very low pitch.

"By this means the distribution of the lines of force of the field can be regulated at will and it is easy to produce magnetic equilibrium of the currents in the two bobbins.

"In the apparatus (shown by the figure) which has been constructed by MM. Emile Gerard et Cie., the two regulating screws are represented on the back face of the magnet. The double bobbin is supported by a cocoon fibre which is axial to a bronze spiral spring forming a connection common to the two circuits. The other connections are made below by two wires. It must be evident that if the two ends of each bobbin require to be available, the upper spiral spring must be replaced by a two-wire suspension, though at the cost of diminished sensitiveness."

ELECTRICAL NEWS FROM LONDON.

BURYING WIRES IN THE STRAND — MR. PREECE AND THE BRITISH ASSOCIATION—NEW ELECTRIC LIGHT WORK IN LONDON AND OTHER CITIES OF EUROPE.

TO THE EDITOR OF ELECTRICAL REVIEW:

For upwards of five weeks the Strand had been impassable for carts and carriages owing to the necessary work in the laying down of the mains for electric lighting. The quantity of patience possessed by the average Londoner is by no means inexhaustible, and as week followed week the voice of the grumbler spoke in no uncertain voice, and day after day indignant protests were made in the public press. Now that traffic has been resumed through the Strand the district surveyor writes to the *Times* in vindication of the action of the Vestry, and points out the many circumstances which obliged so long a time in the carrying out of the work. As soon as the Vestry had decided it was necessary to renew the wood pavement, the Metropolitan Electric Supply Company and Messrs. Gatti saw their oppotunity and at once embraced the chance of putting down mains, but before the work could even be commenced various formalities were necessary and much time was unavoidably lost. Then in taking up the Strand no ordinary roadway had to be disturbed, and trenches were required to a length of more than a thousand yards and sometimes seven feet in depth to receive the mains. Below the wood was at least an inch of asphalt and then a stratum of concrete from half a foot to 12 inches deep. For weeks 200 laborers were employed making their way through this wall of rock, and when that was accomplished and the electric mains fixed, new concrete had to be put down and the wall once more made perfect.

At the British Association's last meeting, Mr. W. H. Preece has certainly been the member whose utterances have earned the greatest attention, and his opinion as to the dangers of electric currents has gained for him the criticism of unscientific as well as scientific journals, and there is now no doubt that in the majority of instances a mistaken view was taken of what he said on the subject. As an electrician of great practical experience, he was advising care and precaution in the use of a power where no scientist has up to the present been able to discover the exact current which is dangerous to life, and ventured to doubt whether all the fatal cases credited to electricity were really attributable to that cause, instancing a late case at Brighton. He also stated that in most cases the accident can be traced to ignorance, stupidity or gross carelessness provided against by extant regulations which were neglected.

Apropos of the British Association Meeting, London *Punch* describes the society as an "association for furnishing middle aged gentlemen with a scientific excuse for a few days pleasant holiday." The idea is happy, if not exactly complimentary.

The Marquis of Lothian K. T., has accepted the office of president of the approaching Edinburgh Exhibition, and to the guarantee fund £200 has been subscribed by the Town Council of Dundee.

An international exhibition of arts, science and trades, in which a special section will be devoted to electricity, is to be opened in a day or two at Hove, near Brighton, and will continue until the end of the year.

Mr. Edison left for New York on Saturday, and during his stay in Europe has seen much and done much by the influence of his presence to urge on electrical industries on this side of the Atlantic. While at Berlin he visited the works of Messrs. Siemens at Charlottenburg, and returned to the city in the "Electra," a boat worked by electricity, after a banquet given in his honor by Herr Werner Siemens. He also attended the Congress of Naturalists at Heidelberg. Before leaving Berlin for London the great inventor expressed himself delighted with the beauties of Berlin, and surprised to discover to how great an extent his inventions were there made use of.

Mr. Edison's stay in England was really a short visit to Sir John Pender, at Foot's Cray Place, Sidcap, Kent, and with whom he visited the Mansion House last Tuesday and was entertained at luncheon by the Lord Mayor and Lady Mayoress. Among those assembled to meet him were Lord Brassey, Sir John Pender, Sir Polydore de Keyser, Colonel Gourand, Mr. J. Staats Forbes and others. On the following day Sir John Pender gave a dinner in his honor at Foot's Cray Place, the company including Lord

Crawford, Sir George Elliot, M. P.; Mr. Spencer Balfour, M. P.; Sir James Anderson, Mr. John Verity, Mr. Preece, F. R. S.; Mr. J. D. Pender and Mr. S. Z. de Ferranti. He also visited the Deptford station of the London Electric Supply Company, and also the central station of the Metropolitan Supply, with all of which he expressed his great approval. His longest stay was made at Paris, and in memory of his visit and as a mark of his gratitude for the reception accorded to himself and his wife, he left 10,000 francs for the poor of the city.

Messrs. D. Moseley & Sons, of Ardwick, Manchester, are now introducing a new paper insulation, to which they have given the name celluvert, and which is made from cotton or vegetable fibre chemically treated. It is very flexible and is made of various thickness, some that of ordinary paper, others in rolled tubes of about half an inch in diameter; it is in various colors and is hard, shiny and smooth. The substance will withstand great heat and possesses large insulating power. It resists oils and is little affected by acids, can be glued to itself or to wood, takes a good polish and varnishes well. It has been used for switches with great success by Messrs. Verity & Sons, and will doubtless be exceedingly useful in the manufacture of various electrical apparatus.

Messrs. Johnson and Phillips, of Charlton, Kent, who are sole licensees and manufacturers in England for Brook's underground system of oil insulation, afforded the electric light companies, the post office and the press an opportunity of witnessing last week various experiments and tests, personally conducted by the inventor, Mr. David Brooks, of Philadelphia. The oil he uses is a refuse of rosin oil, costing only about 4d. per gallon, and his system consists in making use of it in iron pipes as an insulation of copper mains which are kept apart from each other by a covering of cotton or hemp. The various tests and experiments made by Mr. Brooks were all successful.

Messrs. B. Verity & Sons, of Covent Garden, London, have just completed a most complete electric light installation at the Savoy Hotel on the Thames embankment, and from which the Savoy Theatre will also be lighted. In all, about 3,000 lamps of 16 candle-power each have been fitted up, 2,000 in the hotel itself, and 1,000 in the theatre. For the hotel, 11 Sunbeam lamps of 200 candle-power each have also been put up, four in the carriage entrance, five in the courtyard and the remaining two at the entrance to hotel from the embankment. The various fittings are of very handsome design, and principally of copper and brass; the shades in bed and sitting rooms being covered with fancy silk. Each of the rooms has its own switch, by which the current can be cut off or put on as desired, and in the majority of the rooms there is a portable electric lamp standing on fancy brass or copper, and with about 12 feet of well insulated flexible conductor. In fact, everything has been done to add to the elegance of the appearance of the rooms and to the comfort of the occupants. I learn it is further intended to put up on the side of the hotel looking over the river the name "The Savoy Hotel and Restaurant," each of the letters being several feet in height and composed entirely of incandescent lamps. It is estimated that 600 glow lamps will be required for this purpose.

Messrs. Siemens Bros., who had the contract from the corporation of Bradford for the building of electric lighting works, have just completed the station, which was formally opened on Thursday last by the Mayor, Alderman W. Monlson. Alderman F. Priestman having presented the Mayor with a silver gilt key the three dynamos were started, and the Mayor briefly referred to the various difficulties the corporation had had to contend with in regard to their enterprise, being the first municipal body in the kingdom to venture on their own installation. Mr. W. H. Preece, F. R. S., said subsequently that in his opinion the continuous system adopted by Bradford was absolutely safe from all dangers connected with electricity. He did not regard electricity as opposed to the interests of gas producers, for gas should be used for producing heat, and if applied to the working of an electrical engine double the light could be obtained. Alderman F. Priestman, chairman of the gas committee, and also of the committee in connection with the electric installation, did not consider the installation would prove a source of profit for at least two years, as only 5d. per unit was to be charged, the committee hoping by fixing the price so low to induce persons to use electricity. It is also believed that the tramways, which are the property of the corporation, may be worked eventually by electricity and that there might also be a field for its application in the treatment of sewage by the corporation.

Two electric light companies have been established in Newcastle and one will shortly commence operations. Messrs. J. H. Holmes & Co., of the Portland Road Works, have produced for the Sunbeam Lamp Company an incandescent lamp of 3,000 candle power to be temporarily exhibited in the Newcastle Museum. This is believed to be the most powerful incandescent lamp yet manufactured.

The palace now being erected at Drumcondra, near Dublin, for Dr. Walsh, the Archbishop of Dublin, is to be lighted throughout by electricity.

Vienna, like some parts of London, is now greatly inconvenienced by the suspension of traffic, owing to the laying of mains for the electric light. Messrs. Siemens and Halske are well forward in the work and have nearly completed their station at Neubad. Messrs. Ganz & Co., of Budapest, have the contract for adapting the rack railway, connecting Buda with the Schwabenberg for electric propulsion, and have also, in conjunction with the Amalgamated International Company, of Vienna, laid themselves out to supply 100,000 lamps in that city.

Active work in regard to electric lighting has been commenced in Madrid by the English company, and there is no doubt there will be an immense demand unless the gas company reduce very considerably the excessive charge they have been making, 9 shillings per 1,000 feet. A site has been chosen for a central station. Mr. Phillips has been made local manager and it is proposed to commence with 4,000 horse power.

London, Eng., Oct. 1st, 1889. C. Fr.

Electricity in Naval Warfare.

DESCRIPTION OF THE HALPINE TORPEDO BOAT. A SUBAQUEOUS CRAFT ELECTRICALLY PROPELLED AND ELECTRICALLY CONTROLLED. A SUCCESSFUL TRIAL IN NEW YORK BAY.

It is well known that until long after the close of the Civil War, American inventors continued to puzzle their brains and spend large sums of money in the endeavor to construct torpedoes that would be effective against any possible attack by a foreign naval power. It was found that to successfull, attack a thickly armored war ship by this method, it was necessary to explode the torpedo beneath the water line, and in close proximity to the vessel. To guard against this, vessels were provided with strong nets of hemp which were hung around and at some distance from the hull. This afforded reasonable protection until devices appeared by means of which the nets could be cut and broken, after which they were made of steel instead of hemp.

When the steel nets were adopted the torpedo advocates relied upon a larger charge of explosive, which was fired outside of the net, but this was not altogether satisfactory, and the ordinary form of torpedo could not be used to advantage, owing to the fact that the explosion destroyed not only the enemy's vessel, but the craft carrying the torpedo as well, thus rendering practice well nigh impossible, for each discharge involved the total destruction of apparatus costing from two to five thousand dollars.

After a careful consideration of these and other defects in existing apparatus, Lieut. Nicholas J. Halpine, a promising officer of the United States Navy, became convinced that the most practicable plan was to use a submarine boat which would deliver an explosive charge to a point beneath the keel of the enemy's vessel, and then automatically back off to a safe distance before the explosion occurred, so that it could be used over and over again both in practice and in actual warfare.

The problem of how to propel such a craft under water and control it from the shore or from another ship, as well as to automatically deliver and fire the torpedo, was found, as will be readily believed, a difficult one to solve. Just as the Lieutenant's plans were about to materialize, he received orders to join the U. S. S. "Tallapoosa" in South American waters, and it was therefore decided to place the development of the apparatus in the hands of Mr. Arthur W. Savage, the inventor of improved small arms. The successful operation of the first boat built reflects great credit on Mr. Savage, and proves him an inventor of high order. In the designing of the electrical apparatus he was assisted materially by Mr. Frank A. Perret, of Brooklyn, N. Y., whose abilities as an electrician are well known.

The present apparatus was built at the Adriance Machine Works, Brooklyn, N. Y., under Mr. Savage's immediate supervision. It was decided to propel the boat by an electric motor and storage batteries. The Perret motor, manufactured by the Elektron Manufacturing Company, of Brooklyn, was adopted, as being peculiarly adapted to the work by reason of its high efficiency and light weight in porportion to power developed. River and Rail storage battery is used.

The motor is connected direct to the shaft of the propeller, which is of the Bartlett pattern, and was designed especially for the work, being cast in phosphor bronze and having three blades.

It will be seen by the illustration that the boat proper consists of a large metallic cylinder, pointed at poth ends, in which the motor and battery are contained. The weight of these is calculated and disposed so that the boat is kept at proper depth and position in the water. A case containing a powerful charge of explosive is carried in a pocket on the under side of the boat well forward, and is connected with the harpoon by a chain, as shown. When the harpoon strikes anything, it attaches itself thereto, and at the same time the case of explosive is forced forward out of the pocket.

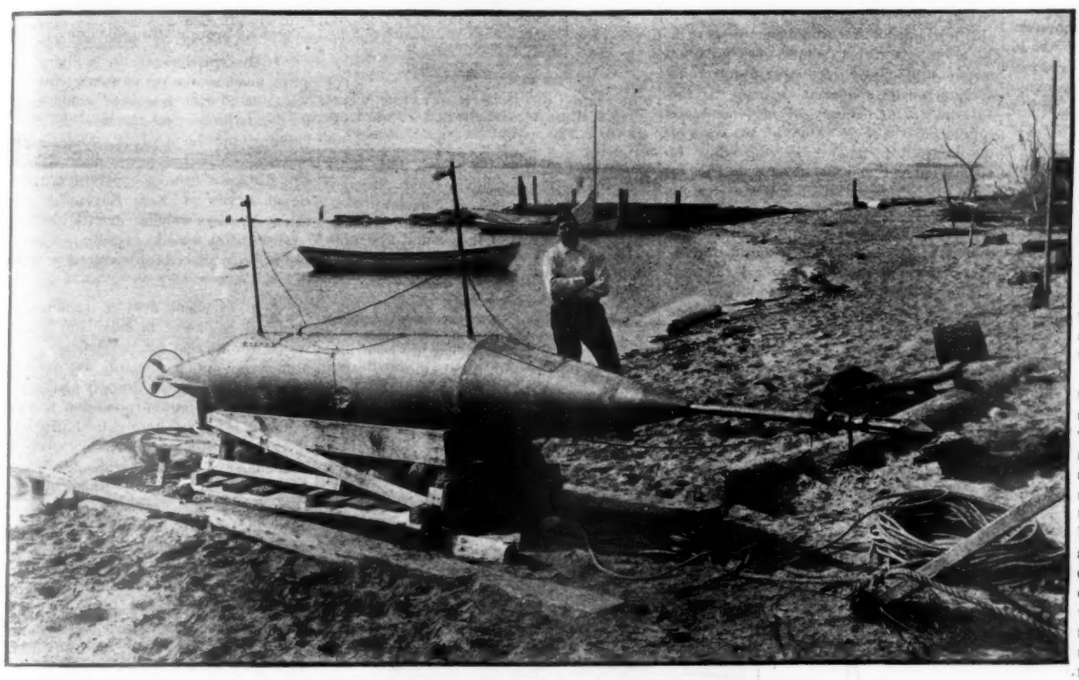


Fig. 1.—The Halpine Torpedo Boat.—Electrically Controlled.

The boat is kept under the control of an operator on shore or on a ship by means of special electrical mechanism on the boat connected by a single insulated wire with switching mechanism and a portable battery at the operator's position. The connecting wire is carried by a reel in the torpedo boat, which pays it out as the boat goes forward. The return circuit is made by the sea.

By means of the mechanism mentioned, together with an ingenious system of relays and currents of varying intensity, the operator may at will cause the torpedo boat to go ahead, stop, go astern, steer a straight course, steer to port or steer to starboard, and cause the guide lights to flash. It is quite remarkable that all these operations are conducted over a single wire. In the experiments lately made this wire was 1½ miles long. By the use of more powerful batteries the distance may be increased to three or four miles.

It is intended that in actual warfare the boat shall run a few feet below the surface of the water to protect it from the enemies' shots. Two small staffs will project above the surface and carry red and green electric lights, which may be flashed at the will of the operator and enable him to determine the position and direction of the craft at any time.

When the prow or harpoon of the torpedo boat strikes the vessel that it is sought to destroy, or the net surrounding the vessel, it attaches itself thereto, together with the case containing the explosive, and a time fuse is ignited. At the same time the motor is automatically reversed and the boat backs to a place of safety, from whence it may be guided to the operating station.

The reel of wire is so designed that when the boat returns from an attack, to receive a fresh charge of explosive, a fresh wound reel can be instantly substituted for the one that has been unwound, thus placing the boat in readiness for an immediate second attack.

The speed of the present boat is about 11 knots. It is intended to put in more power, and the inventor hopes eventually to attain a speed of 25 knots an hour.

.... The Shaffer automatic sprinkler and fire alarm consists of a small hollow iron box, filled, as usual, with a material which expands under heat, and which in its expansion first closes an electric alarm circuit and next operates a compound lever which opens the sprinkler, and admits the water through a spreader on to the fire.

* * Contracts for the engine and boilers for the Albany railway electric plant (Albany, N.Y.) have been made by officers of the railway company, under which it is stipulated that the goods are to be delivered in six weeks. The contract for the engine was executed last week with the Auburn Machine Company, and that for the boiler with the Babcock & Wilcox Company.

* * A largely attended hearing was held a few nights ago before the Waltham (Mass.) board of aldermen, on the petitions of the Newton Street Railway Company for several changes of location. The most important points at issue related to the building of the track through River street to Watertown, and the changing of the location of the track so that it shall be on the side of the street rather than in the center.

* * L. H. McIntyre, of the Thomson-Houston street railway department, was in Washington a few days ago to give directions about the construction of the Tennallytown road, which is well under way, with a prospect of having the cars running some time in November. Six cars, each provided with two 15 h. p. motors will be put on, and the power will be furnished by two 80 h. p. dynamos driven by two 125 h. p. Corliss engines. The power station is located in the middle of the line, which is 4½ miles long, with double track, 60 pound steel rails, the entire distance. The road runs up hill nearly all the way from Georgetown to the northern terminus, the grade at one place being over 10 per cent.

* * The East Orange Rapid Transit Company, East Orange, N. J., has been organized, with the object of building and operating a cross town railroad, employing electricity by the storage battery system as the motive power. Its route is projected from the corner of Center street and Elliott Place to Sandford street, Central avenue, Clinton, Main, North Clinton streets and Marcy avenue to Prospect street, ending at the station of the Erie railroad. An agent is now engaged in securing consents to right of way from property owners along the proposed route. The following officers and directors have been elected: James E. Reynolds, president; O. W. Child, vice-president; H. S. Forman, secretary; F. W. Child, R. W. Hawkesworth, H. S. Iselin, George Cooley.

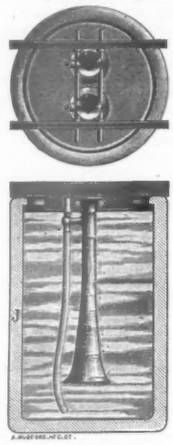
* * In the new repair shops of the Fitchburg railroad, at Fitchburg, is a transfer table worked by the Union Electric Car Company's system. The motor is geared to the front axle, and the gears run in an enclosed bath of oil. They are brass cut gears, and work with the least possible friction. The switch which governs the motor and controls the car is just above the motor, on a platform built out from the front of the car, as are also the reversing bar and the handle, throwing in and out the clutch by which the motor is used either to propel the car in the desired direction or to draw off and on the cars to be changed from one track to another. The two shops are each 500 feet long, and face each other. Each shop is divided into three divisions, separated by brick walls. In each division there are eight tracks, making 24 in each shop. Between these shops, which are 75 feet apart, is the pit in which the transfer table moves. The car is ten feet long and 70 feet wide, and runs on four rails laid in the pit. The table is run by the dynamo which lights the shops at night, and is connected by two overhead wires, on which run two trolleys, the trolley-poles being on the top of the house built over the front platform at the front of the table. Three men, one being at the dynamo, now run the table and draw on and off the cars.

The Schuyler Company's Constant Current Regulator.

This company have lately improved the beautifully ingenious regulator which they install with their arc lighting plants. The apparatus has been improved in many of its details, but chiefly in the glazed stoneware jar used as the variable resistance in shunt with the field, in the iron frame for supporting all movable parts and in a more effective location of the motor-magnet. We have before described this regulator, but a brief reference will serve to enlighten those of our readers who have not seen the description. The dynamo (open circuit armature type) is series wound, and has two shunts around the field circuit, one a reliable liquid resistance, and the other at times of danger only practically short-circuiting both the field and variable resistance. A controlling magnet receives the line current, and directly regulates, when the line current tends to fall, by causing the liquid resistance to be increased proportionately. This magnet also on rise of current above normal, opens a short circuit around the motor-magnet, which then receives the line current suddenly, acts promptly and lowers the liquid resistance. On sudden abnormal rise of line current, the controlling magnet instantly closes a dead short circuit around the field magnets and their variable resistance shunt, and danger is averted. No attempt is made to compel one regulating magnet to do all the regulating from zero to a dangerously abnormal current. All the adjustments for delicacy of movement are concentrated at the position of the cores of the controlling magnet corresponding to normal current, and therefore a position of cores can be selected which will be extremely sensitive to minute variations of current, and no regard has to be paid to constructing a magnet having a pull proportionate to the current. Herein lies the beauty of the device. All the rough work entailed by sudden rise of current due to cutting out of lamps is done by the motor magnet, except when an unusual and greatly excessive reduction of the line resistance occurs, and then there is no time or need for nicely graduated movements, and the controlling magnet drops its delicate functions and drives the cores home instantly to short circuit the field-magnet. The practical results are most satisfactory to the makers, and we do not see how it could be otherwise.

Telephone Improvements.

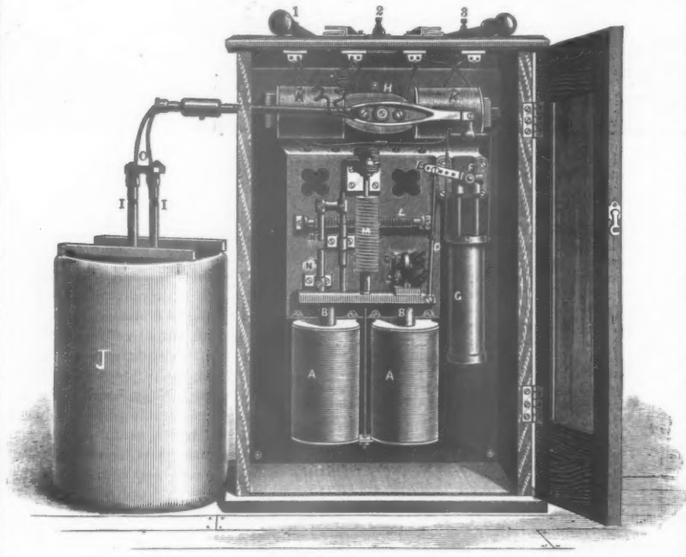
General Manager McKinstry, of the Northwestern Telephone Exchange, has returned to St. Paul, Minn., and will begin work on the proposed improvements in the telephone service. Contracts have already been let to the Western Electric Company, of Chicago, for two new switchboards, one for St. Paul and one for Minneapolis, each having a capacity for 4,000 subscribers. The work on the conduits will be begun this week and it is planned to lay about a mile



SCHUYLER COMPANY'S REGULATOR VARIABLE LIQUID RESISTANCE. — SECTION AND PLAN.

before the frost stops the work. The tunnel from the Lorimer building, where the new offices are to be located, to Nicollet avenue will be large enough for a man to walk through. The cost of the conduit system is estimated at $20,000 a mile, and this season's outlay in the Twin Cities will exceed 60,000.

* * The Julien electric cars have now been in regular passenger service for a little over two years; and a report has just been prepared of the cost of motive power during that time. The motive power includes the renewal of batteries, the wear and tear on motors and machinery, the generating and storing of the energy, and repairs and replacements generally. The cost of motive power has been a trifle less than five cents per car mile; in this the cost of maintaining the batteries has amounted to 1⅞ cents per car mile. It is interesting to know that the estimate of the cost of motive power as based on the experiences of the Julien Company on the Fourth and Madison avenues, New York, and prepared prior to the report at Brussels, and without any knowledge of the cost there, is within a fraction of being the same. The Julien Company find the cost of motive power on Madison avenue to be 5.3 cents per car mile. In the cost of motive power as estimated in New York, however, was included interest on investment amounting to 1.8 cents, or 3.5 cents per car mile net, including depreciation of of battery, cost of generating current and handling of batteries.



THE SCHUYLER COMPANY'S CONSTANT CURRENT REGULATOR.

* * The Topeka City Railway Company has been granted the right by the city council to use electricity. This will make the second road using electricity in this progressive Western city.

* * Chicago capitalists are negotiating for the purchase of the Belle City Street Railway Company. A purchase price of $78,000 has been agreed upon and the purchasers will arrive very shortly and consummate the deal. The new company, it is understood, will substitute electric power for horses.

* * The Postal Telegraph Cable Company has opened the following offices: Hallowell, Me.; Bath, Me.; Augusta, Ga.; Atlanta, Ga.; Marietta, Ga.; Rome, Ga.; Birmingham, Ala.; Anniston, Ala., and Gadsden, Ala.

* * The French cable, now connecting at North Eastman, will be landed at Rockport, Mass., in a few weeks. It will be run into the cable house at Cape Hedge, and new instruments will be put into the Commercial Cable Company's office, the companies having combined.

* * The Illinois Central R. R. Co. is utilizing in Chicago a two horse-power motor to drive an engine which pumps gas into tanks which serve as reservoirs on its trains. The arrangement is an experiment in train lighting. Each car thus illuminated had 11 lamps, each with burners.

* * Some very interesting experiments in welding cables by electricity, for use on cable roads, have recently been made by the Thomson Electric Welding Co. It has been demonstrated that while by means of a splice 30 per cent. only of the strength of a perfect cable was secured, by an electric weld 87 per cent. was secured, thus proving the superior efficiency of the latter method of making joints. The company will have to greatly enlarge its manufacturing facilities.

* * Headquarters of the military telegraph business on the Atlantic coast from Maine to Florida has been established in Boston, in the central tower of the Federal building, and Lieut. J. P. Finley, United States signal corps, placed in charge. He will also have general supervision over the signal service of New England. Lieut. Finley has been connected with the signal service almost since its organization in 1870, and is distinguished for his recent researches in ocean meteorology.

* * An excellent field is opening out to electrical engineers in Asia, and one, too, which is quite ripe for development. Only a short time ago a company was formed in China for the purpose of supplying electricity chiefly for lighting purposes and a similar company is now operating in Japan, where the Emperor lights his palace by electricity. The Shah of Persia is also about to have one of his palaces similarly illuminated. In India the use of the electric light is making slow but steady progress. Some of the smaller monarchies have already adopted it and others are considering the matter. A short time ago the harbor trusts of Kurachi and Rangoon decided in favor of the use of electricity, and now the Calcutta port commissioners have followed their example and are supplying their jetties, the Hoogly pontoon bridge and their wharves with the electric light. One of the chief advantages of the substitution of electricity is that vessels will in future be able to discharge or load cargoes at night time, and for this purpose it is proposed to put up connection boxes within and outside the jetty sheds, and in and on these will be placed movable arc lamps.

* * The property of the Baxter Electric Manufacturing Motor Co, of Baltimore, which was advertised to be sold at a receivers' sale was not put up at auction as intended. A creditors' meeting was held at noon, which was presided over by Mr. Cumberland Dugan, and the creditors holding the majority amount of indebtedness resolved to request the receivers, Messrs. J. Frank Morrison and Luther M. Reynolds, to withhold the property, as they expected to sell at private sale in a few days. The property is a large one, in fee, consisting of the block bounded by the center lines of Chester, Biddle and Chase streets and Collington avenue, improved by a large new two-story machine shop, about 60 by 320 feet, also foundry, pattern shop and engine house 60 by 100 feet. The house and lot cost $78,000, and the machinery is said to have cost about $40,000. The amount of indebtedness to be satisfied is about $130,000. Valuable letters patent for the United States and other countries are the property of the concern, besides motors finished and partly constructed. Mr. Benson M. Green is president of the company. He and Mr. Morrison are large creditors and stockholders.

Accidents to Linemen.

Two linemen met their death in this city last week while engaged on pole work. One was Chas. Edman, who received a severe shock and fell to the street and died in 10 minutes. The other death was most tragic, and has caused much excitement. Lineman Feeks, of the Western Union force, was at work in the midst of a network of wires on a pole at the corner of Centre and Chambers streets—where there were no electric light wires—when he received a shock from a current evidently coming in on a telegraph wire crossed with some stronger current wire, and for nearly an hour the poor fellow remained entangled in the wires in view of thousands, the current continually passing through his body. Other linemen well protected with rubber gloves finally appeared and the body was removed. The press of the city has devoted columns to the description and illustration of this sad spectacle, and the electric light companies have had to bear much criticism.

Mayor Grant was in favor of cutting down all the wires that the electrical expert of the Board could not certify as being safe, but notices of injunctions served by the Brush, the United States and the Manhattan and other companies put a temporary stop to such work.

A force of men under the guidance of Expert Wheeler, of the Board of Control, are engaged in inspecting the wires of the city with a view of condemning all those where the insulation is impaired or the wires are in a dangerous position.

A box was placed on the pole where the accident happened to Lineman Feeks, and $1,000 had been collected for his family by the first of this week.

Several of the electric lighting companies complain that the Board of Electrical Control has not permitted them to keep their aerial wires in good condition. Mr. Chas. W. Spear, of the Brush Company, is reported as saying that

"It is not the electric light companies who are responsible for these deaths. The sole and only responsibility for them lies with this Board. Our business is dangerous, of course. So are railroading and manufacturing. But the business of electric lighting can be made as safe as any mechanical pursuit involving the use of machinery. When the Board of Electrical Control undertook to manage our plants and restrict our efforts at keeping our lines in repair, then the situation becomes what you see it now. On the 18th of last February they refused our employés the right to mount poles for the purpose of repairing defective wires, and went to the length of having them arrested. If our circuits are bad it is their fault. We ask these politicians for permission to mend a wire, and find they haven't met, are out in the country, and it is six weeks before they meet. Perhaps then they get tired of the applications and lay them on the table. Meanwhile the wires and the plant generally go from bad to worse. New customers come in and want facilities. Let me ask a discerning public if it is not chance, and chance only, that has prevented the subways from killing ten times the number of persons that electricity has killed in this town? When they do lay subways they refuse us permission to get our wires from the plant to the nearest point where an entrance can be effected. We have nothing to say at present about the integrity of this board of politicians, but I do want to say that all the companies believe that Mayor Grant is perfectly honest in the stand he is taking, and the professions he makes on this subject.

"Did it ever strike you that New York is not the only great city in the country that possesses great electric lighting plants? Don't you know that Boston, Philadelphia and Baltimore have plants that can compare in many ways with ours? Did you ever hear of such loss of life in these cities as we have had in New York? No; and I will tell you why. These great cities have no boards of politicians to clog the proper management and repair of their electric lighting lines. London tried electric lighting with a board of politicians and nest-featherers in control. It failed. Then she abolished the politicians, and electric lighting in that city is now rapidly becoming a success. New York, too, has had enough of this sort of thing. We will see what the courts say about it."

—— The new electric light company at Bridgwater, Mass., has contracted to have the plant in operation there by November 1. The poles are nearly all set and most of the wires have been strung.

"The Dangers of Electricity."

Every accident due to electric light wires with which I am acquainted has been traced to stupidity, ignorance, or carelessness, sources of danger much more prevalent with gas and steam than with electricity, and every one remediable and provided against in regulations extant, but neglected. It cannot be too strongly urged that the great sources of danger in electric light wires are bad material, inexperienced workmen, neglect of rules, and imperfect inspection. Cheap work in electric light equipments is not only nasty, but very dangerous.—*W. H. Preece.*

—— The electric light on the Eiffel Tower, Paris, is reported to be visible at Orleans, 69½ miles distant.

—— The electric light company at Westboro, Mass., expect their new boiler and dynamo daily. The engine arrived several days ago, and has been set up. A large number of incandescent lights have been put in, but will not be ready for use until the new machinery is running.

—— At a meeting of the Borough Council, of Downingtown, Pa., held on October 7th, 1889, bids for lighting the borough were received; these varied from $20 per lamp per year (for gasoline lamps), to $12.50 per lamp per year, from a local gas company. Each of these were on the old-fashioned basis of 27 nights in the month for the lamps. The bid of the Downingtown Light and Power Company (electric) was for 25 candle power lamps, to burn every night in the year, at $14.50 per lamp per annum, but in spite of an excellent speech made by Councilman Tutton, and his support by Councilman Guthrie, the four other members of the board took pride in enrolling Downingtown among the relics of the dark ages, and gave the contract to the gas company.

—— The Thomson-Houston Company reports the following sales of incandescent apparatus for isolated plants: Central Union Depot, Cincinnati, 200 arc; Bellaire Nail Works, Bellaire, O., 50 arc; Baugh & Sons, Philadelphia, Pa., 50 arc; S. L. Allen & Co., No. Pennsylvania Junction, 400 incandescent; John C. Holmes & Co., Springfield, Ill., 100 incandescent; Clark & Milliken, Richmond, Me., 50 incandescent; Rays Woolen Mills, Franklin, Mass., 250 incandescent; Diamond Match Works, Westville, Conn., 50 incandescent; C. I. Hood & Co., Lowell, Mass., 300 incandescent; Cornell Mills, Fall River, Mass., 800 incandescent; Roberts Iron Works, Cambridge, Mass., 50 incandescent; Knowles Loom Works, Worcester, Mass., 45 arc; Portland Steam Packet Co., Portland, Me., 300 incandescent; Hopedale Elastic Fabric Co., Hopedale, Mass., 400 incandescent; Sheffield Worsted Co., Pascoe, R. I., 300 incandescent; A. L. Sales, Pascoe, R. I., 50 arc.

—— During the month of September, the Westinghouse Electric Company of Pittsburgh received the following orders for central station alternating current apparatus: Keokuk, Ia., 750 lights; McMinnville, Ore., 500 lights; Aspen, Colo., 750 lights (increase); Vandalia, Ill., 750 lights; Albany, Ore., 500 lights; Victoria, Tex., 500 lights; Lincoln, Ill., 750 lights; Denver, Colo., 3,000 lights (increase); New Bedford, Mass., 1,500 lights (increase); Petaluma, Cal., 500 lights; Bridgewater, Mass., 500 lights; Salem, Ore., 750 lights; Bellaire, O., 750 lights; Houston, Tex., 750 lights; Manchester, Ia., 500 lights; Seattle, Washington, 750 lights (increase); Allegheny County Light Company, Pittsburgh, Pa., 3,000 lights (increase); Grafton, Dak., 500 lights; Williamsport, Pa., 1,500 lights; Amherst, Mass., 500 lights (increase); Duluth, Minn., 750 lights (increase); Helena, Mon., 1,500 lights; Colorado Springs, Colo., 750 lights (increase); Ballston Spa, N. Y., 750 lights; Plattsburg, N. Y., 750 lights; Tyrone, Pa., 750 lights (increase); Kansas City, Kan., 750 lights (increase); Marengo, Ia., 500 lights; Media, Pa., 500 lights (increase); Greensburg, Pa., 750 lights (increase). Total, 26,750 16-candle power lights capacity. Arc lights for central station use; Williamsport, Pa., 250 lights.

—— The United States Electric Lighting Company, of Washington, D. C., declares that no underground cable has yet been made that will carry a 2,000 volt current without risk of being destroyed.

—— A system of mining by electricity is to be put in operation in the Girard Coal Company's mines. The outfit will be put in under a guarantee to produce 1,000 tons of coal every 24 hours. To accomplish this result, and at the same time light the mines with 150 electric lamps, the Drill Company is putting in with the steam plant a generator, three motors and as many drills, with all the necessary connections, wiring, etc.

—— An occasional correspondent of the REVIEW, after an extended trip over the West, writes us that "the West is booming in every respect and electricity is more universal there than in any other section of the country. Every house of any pretensions at all is wired for incandescent lights. No matter how mean the hotel is in the rest of its accommodations, it is well illuminated with electric lights. Places out of the line of travel and without any other feature to recommend them have a full-fledged plant in operation." Good for the West.

—— The Thompson-Houston Company reports the following sales of incandescent apparatus to local companies: West Superior, Wis., 1,300; Westboro, Mass., 650; Boston, Mass., 500; Waterbury, Conn., 1,000; Lowell, Mass., 1,000; Altoona, Pa., 1,000; Amherst, Mass., 850; Germantown, Pa., 3,250; Brooklyn, N. Y. (Municipal Co.), 1,300; Jersey City, N. J., 1,300; Hudson, Mass., 650; Norwalk, Conn., 650; Lebanon, Ky., 300; Newton, Mass., 1,000; So. Framingham, Mass., 500; Eastport, Me., 500.

—— Some inquiry has been made by enterprising electrical men about a job of lighting for the new library building in Washington. That establishment will call for extensive work, but it will not be ready for five years. The building, which faces the Capitol, will be 470 feet long, 340 feet wide, five stories high, and will have a rotunda larger than the one in the Capitol building. A thorough system of masonry wire-channels will be made throughout the building, and abundant room for machinery will be provided.

—— Electricity in the polar regions is perhaps a phenomenon well known in connection with the "Aurora" lights, but when the inhabitants of a town within the polar circle, who have lived in darkness for three months out of the twelve, adopt electricity for lighting purposes, electrical science verges almost on the romantic. Such is the case however. The town of Hammerpest, the northernmost habitation in Europe, in latitude 70½° north, has decided to establish a central station for lighting the streets of the village.

—— The city's contract for electric lighting Pittsburgh is being rapidly completed. The Allegheny County Electric Light Company is now putting up 192 additional arc lights in the hill district and in Lawrenceville. One hundred and fifty-four lights are placed along Wylie avenue, Bedford avenue, Webster avenue, Franklin street, Fulton street, Center avenue, Cliff street, Bluff street and Hazel street. The 38 remaining lights are distributed along Liberty street, Smallman and Pike streets. The poles are already in the ground and mast arms are being attached.

—— The sale of electric apparatus of the Westinghouse Electric Company, of Pittsburgh, Penn., from Sept. 1st to 21st, amounted to over $1,000,000 and it is expected that the total for the month will be from $300,000 to $400,000 more. Among some of the largest contracts closed were those in San Francisco, Cal., and Alleghany City, Penn. Last week the Westinghouse electric factories in Pittsburgh, Penn., commenced running a night and day gang in order to fill out their orders. The Sawyer-Man electric factories in New York put on two gangs of men a week ago Monday to fill orders and claims to have received orders for 20,000 lamps in one day last week.

ELECTRIC LIGHT NEWS

—— The Sandusky, Ohio, Gas and Electric Light Company will build a new stone building at their works to cover their entire apparatus. It will cost $10,000.

—— The city of Menasha, Wis., has closed a contract with the local gas and electric light company for street lighting, the company furnishing 27 arc lamps for $69 each per year.

—— The Mayor of Burlington, Iowa, has signed the ordinance granting the Burlington Gas Light Company the right to erect and operate an electric light plant. The T.-H. system will be used.

—— The Electric Light Company, of Salt Lake City, have their poles nearly all up for lighting the street intersections, seven miles of wire have been received, and they expect to have the city lighted up before Dec. 1st.

—— The Westinghouse Electric Light Company have purchased power of the Portsmouth Company at South Berwick, N. H., and propose to put in a plant there to furnish electric light for the towns in Maine and New Hampshire centering there.

—— At the special town meeting at Lake Village, N. H., it was voted to allow the selectmen to make a contract with some electric light company, the expense not to exceed $1,200. Agents of the Thomson-Houston Company, the Westinghouse, also the New York Company, were present, but it was left to the discretion of the selectmen as to which system would ultimately be selected.

—— An Illinois stranger at a Toledo hotel, unfamiliar with the electric light, tried to blow it out. No use; next he tied knots in the string, by which it was suspended, hoping to choke off the light. That failed, and then he wound a towel around the bulb and went to bed. After he was asleep the towel ignited and set the room on fire. The house was saved from a conflagration by the timely discovery of the night watchman.

—— On the 2d October the municipal authorities of Lynchburg, Va., opened bids for street lighting as follows: Mutual Co., of Brooklyn (Knowles system), 30 cents per lamp; Thomson-Houston Co., 35 cents per lamp; Fort Wayne Jenney Co., 36 cents per lamp; Schuyler Co., 37 cents per lamp; Indianapolis Jenney Co., 38 cents per lamp. All these proposals were rejected and new bids asked for, to be opened on the 16th inst.

—— It is proposed to form a co-operative electric lighting company at Northampton, Mass., for the purpose of furnishing lights to the subscribers at the actual cost of production. The Westinghouse Electric Company proposes to furnish a plant all complete at a cost not to exceed $10 for each light of 16 candle power. E. E. Wood will furnish power at his factory. The power will cost $2 a light per year and renewal of lights that are warranted to run 600 hours will cost 50 cents each.

—— The new hotel just completed in Washington, D. C., by Vice-President Morton, and named the "Shoreham," will be opened this week. It has been provided with elegant and tasteful combination fixtures for about 2,000 lamps by Thackara, and has been wired by one of the Edison companies, while the current will be furnished by the local lighting company. The working of this plant will be watched by electricians with much interest, from the fact that the manner of wiring is a wide departure from the ordinary methods. Composition tubing, made of paper and pitch, was laid in the walls and ceilings of the building during the course of construction and, after its completion, double, flexible, cotton-covered conductors were drawn into the tubes.

KINDRED INTERESTS

The Electric Dissipator.—Messrs. J. H. Bunnell & Co., New York, are meeting with unqualified success in introducing this appliance for neutralizing the electric charge in printing. The dissipator is said to be successful in all cases, not excepting those where the most troublesome paper is used, and in dryest, cool weather.

The Samson Battery has met with a large sale during the nine months just ended. The Electric Gas Lighting Company report the actual figures to be 25,000 sold since January 1st, 1889. A fire department superintendent in a neighboring city considers that the Samson saves him $2 a battery per annum in care and attention.

New England Electric Supply Company.—The New England Electric Supply Company, of Bridgeport, Conn., which is the owner of patents relating to the application of electricity to drawbridges, has just contracted for placing a motor on one of the drawbridges at Wilmington, Del. A five horse-power motor will be used. The use of electricity for this class of work is becoming more and more general.

Ball Engine Company, through Messrs. C. R. Vincent & Co., of this city, have placed another Ball engine in the Edison electric illuminating station at Paterson, N. J., which makes the third one now in this station. At the Paterson Electric Light Company the seventh Ball engine has just been put in. The Excelsior Jute Works, of Brooklyn, have ordered another engine of the Ball type; also the Kreuger Brewing Company, of Newark, to be used for electric lighting.

The Thomson-Houston Company reports the following sales of arc apparatus: New London, Conn., 30; Youngstown, Ohio, 50; Erie, Pa., 30; Van Wert, Ohio, 50; Bethlehem, Pa., 50; Montpelier, Vt., 50; Rockville, Conn., 110; Columbus, Ohio, 150; Nashua, N.H., 50; St. Joseph, Mo., 50; New Bedford, Mass., 50; Vincennes, Md., 30; Covington, Ky., 35; Joliet, Ill., 100; Waycross, Ga., 50; Springfield, Ohio, 50; Passaic, N. J., 50; Sioux City, Iowa, 85; Bradford, Pa., 50; Peoria, Ill., 405; Lowell, Mass., 25.

Armington & Sims Engine Company.—The history of this engine in electric lighting circles has been an unbroken series of successes, and to-day the greatly enlarged works at Providence are unable to keep up with orders. The government vessels, "Vesuvius" and "Petrel," which are lighted by electricity, are also supplied with Armington & Sims engine of the new type built especially for marine work. These engines are reported as giving the best satisfaction. The electric lighting systems of Thomson-Houston, Westinghouse and Edison are to be tested at the Johns Hopkins University under the direction of Dr. Louis Duncan, the test now being in progress. The Armington & Sims engine has been selected for use in this test.

The Watervliet and Turnpike Railroad Company, Albany, N. Y.

The accompanying illustration is made from photographs of the Watervliet and Turnpike Railroad, Albany, N. Y., which has been in operation since September 29, and which was equipped by the Thomson-Houston Electric Company, of Boston, Mass., using their railway system. The road consists of 7 miles of double and 8¾ miles of single track, making a total of 23¾ miles. The maximum gradient of the road is 4.2 per cent. The car equipment consists of 16 cars, each equipped with two 10 horse-power Thomson-Houston railway motors, and 38 tow cars, 31 of which are box cars and 7 open. The cars were built by the Jones Manufacturing Company, and are well made and finished.

The power station, a one story brick building, is situated about half way between the terminals of the road, and adjacent to the car house, which has a capacity of 35 cars.

The steam plant consists of three steel boilers of 150 horse-power each, and three 125 horse-power engines built by the Taylor Manufacturing Company.

THE WATERVLIET ELECTRIC RAILWAY, ALBANY, N. Y.

The electrical apparatus comprises three 80 horse-power Thomson-Houston railway generators belted direct to the engines, and all the electrical appliances necessary for the satisfactory operation of the same.

The operation of the cars since the day of starting has been eminently successful in every particular.

The Ball Engine Company announce that they re-opened their Chicago office (formerly with Messrs. Kingsland Bros.) at Room 403, Home Insurance Building, No. 205 La Salle street. This location will be found very convenient and central. Mr. H. A. King, from our home office, will be in charge of this branch of their business.

An Electrical Beehive.

The tendency to concentration which is manifested in most lines of trade is not wanting in the electrical industry at Boston. It was but a short time ago that the first electrical firm moved out of the heart of the city, as it then seemed, and took offices on Atlantic avenue, in the Estes Press Building, which has now become almost entirely occupied with the offices of manufacturers of electrical supplies and apparatus or those interested in kindred interests. As this building gathered more and more electrical people within itself, other buildings in the immediate vicinity began to be investigated as to their fitness for a like occupation. Of these the Estes Press, an excellent illustration of which is here given, 196 Summer street, two doors below the Hathaway building, has become the most popular. The New England office of the ELECTRICAL REVIEW were moved there in the late spring. Later arrivals are Frank Ridlon & Co., the Wright Electrical Engineering Company, the Shipman Engine Company, and Pettingell, Andrews & Co. The latter firm occupy the main portion of the street floor at the left of the entrance, giving a fine opportunity for the display of the specialties handled by them, while the executive offices are delightfully situated in front with a southern exposure. Storage rooms have been secured in adjacent portions of the building. The Shipman Engine Company occupy the basement floor at the right of the entrance, and their large line of apparatus is easily displayed. The remaining electrical firms and agencies occupy spacious quarters on the third floor, which, with the southern and western exposures, are well lighted and cheery. The P. & B. Conduit and Construction Company of Maiden Lane, New York, represented by Mr. Wm. W. Castle, general manager. At the present rate of settlement it will be but a short time before nearly every electrical interest in Boston will be represented in or near the Hathaway Building or Estes Press.

ESTES PRESS BUILDING, ONE OF BOSTON'S ELECTRICAL HEADQUARTERS.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON OCTOBER 9, 1889.

412,323 Method of electrolytically reducing plates for secondary batteries; Stanley C. C Currie, Philadelphia, Pa., assignor to United Electric Improvement Co., Gloucester City, N. J.

412,332 Electrically controlled speed governor mechanism for elevators. 412,333 Electrically controlled valve operating mechanism for elevators; Wm. P. Gibson, New York, N. Y.

412,345 Frame for secondary batteries; Walter F. Smith, Philadelphia, Pa., assignor to United Electric Improvement Co., Gloucester City, N. J.

412,346 Connector for batteries. 412,347 Connecting driver for electric batteries; Walter F. Smith, Philadelphia, Pa., assignor to the United Electric Improvement Co., Gloucester City, N. J.

412,349 Dynamo electric machine. 412,350 Commutator. 412,351 Dynamo electric machine. 412,352 Dynamo electric machine. 412,353 Dynamo electric machine; Chas. F. Winkler, Hoosick Falls, N. Y.

412,419 Artificial resistance for electric circuits; Chas. B. Askew, Chicago, Ill.

412,460 Circuit closer for lighting apparatus; Geo. D. Burton, New Ipswich, N. H.

412,464 Electric igniting device for lamps; Manuel Carranza, Guatemala, and José M. Tinoco, San Francisco, Cal.

412,476 Electric conduit; John P. Cushing, Beverly, Mass.

412,507 Non-conducting lining; Oliver P. Hurford, Chicago, Ill., assignor to Jas. P. Black, same place.

412,528 Electric motor for railway cars; Wm. M. McDougall, East Orange, N. J.

412,529 Electric motion controller. 412,530 Electric signal controller; Gustave S. New, New York, N. Y.

412,563 Electrical door alarm; Daniel S. Streeper, Norristown, Pa.

412,567 Governor for electric generators; Patrick J. Tracy, Racine, Wisconsin.

412,579 Microphonic transmitter. 412,579 Telephone station apparatus; Bremo Abdank-Abakanowicz, Paris, France, assignor to the Am. Bell Telephone Co., Boston, Mass.

412,599 Process of electric welding; Charles L. Coffin, Detroit, Michigan.

412,605 Electric railway; Leo. Daft, Plainfield, N. J.

412,639 Secondary battery; Farnham M. Lyte, London, County of Middlesex, Eng.

412,666 Electrical railway conduit and current plow; Jesse W. Reno, Denver, Colo.

FOR SALE.—One 150 Incandescent Light Dynamo, standard make. Address

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WANTED.—A YOUNG MAN, THOROUGHLY up in Steam and Electrical Engineering, desires to associate himself with some electrical or engineering firm as engineer and selling agent. Is capable of securing franchises and contracts—organizing and interesting capital. Has recently organized and equipped a $25,000 plant. Can make plans, estimates, etc., and is experienced in all the details of construction. Is a practical machinist, and up with the latest developments in engineering. Is superintendent and electrician of above plant. Has extensive work in view in the way of municipal and isolated plants. Best of references.
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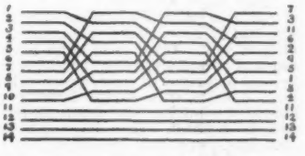

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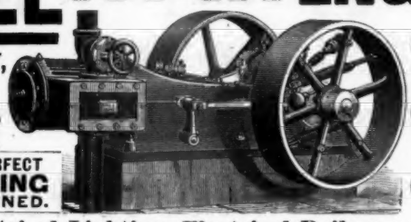
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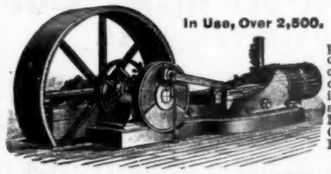
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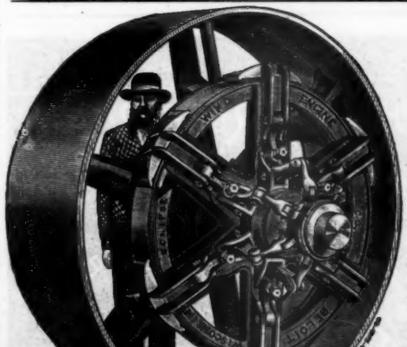
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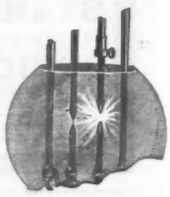

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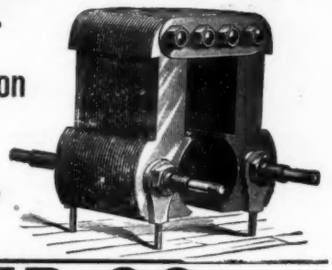

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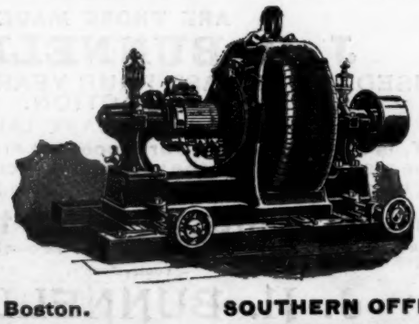

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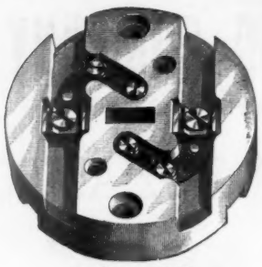

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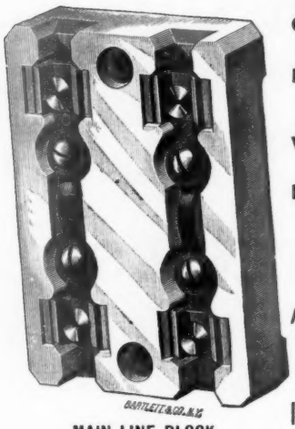

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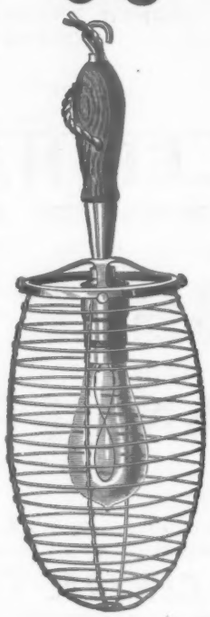

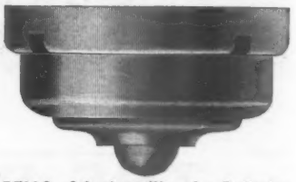

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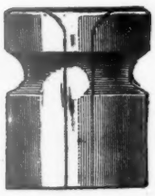

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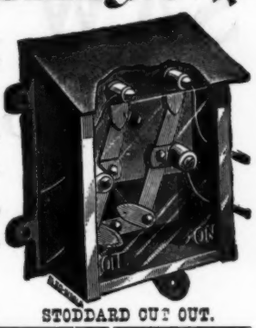
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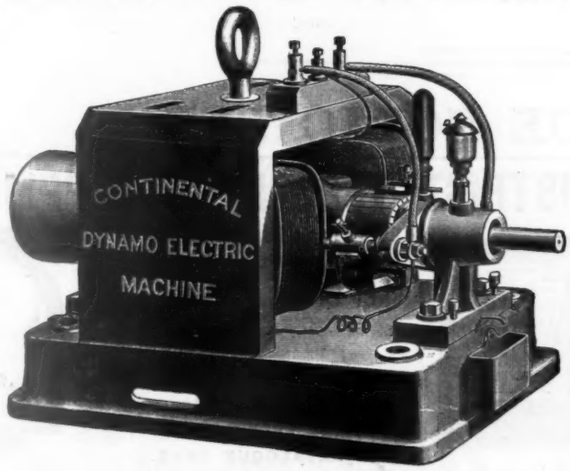

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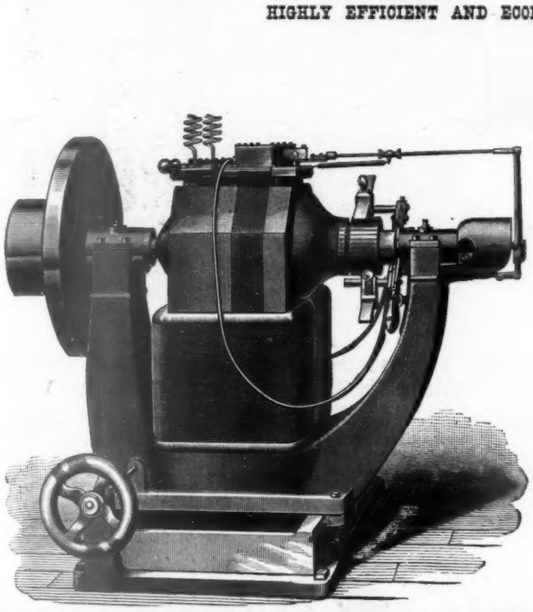

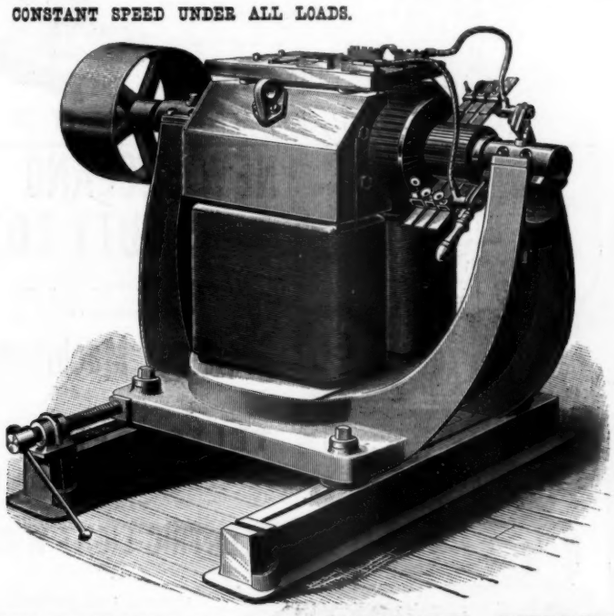

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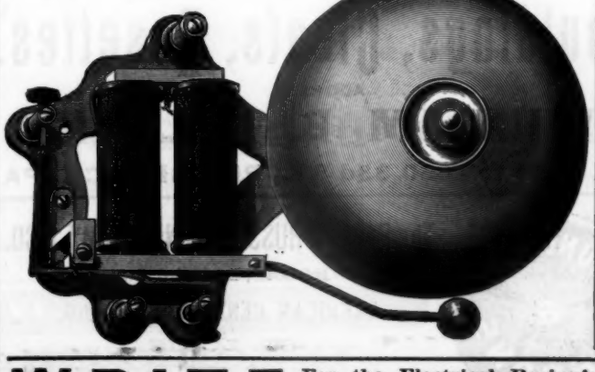

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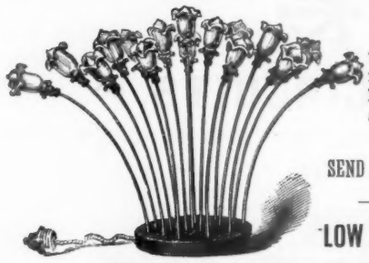

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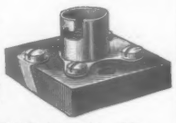

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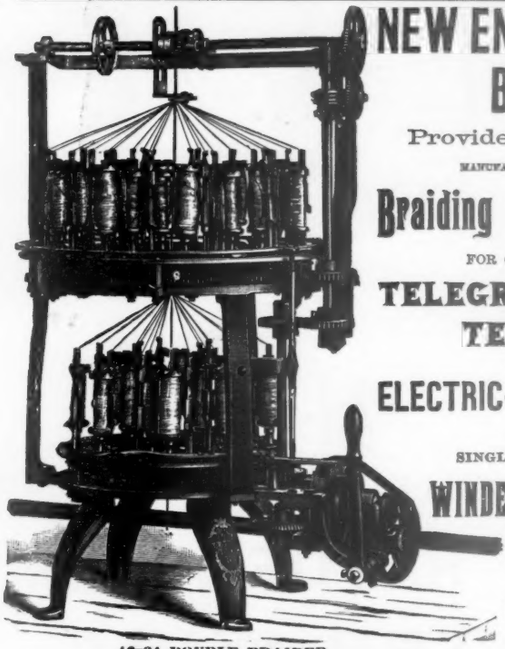

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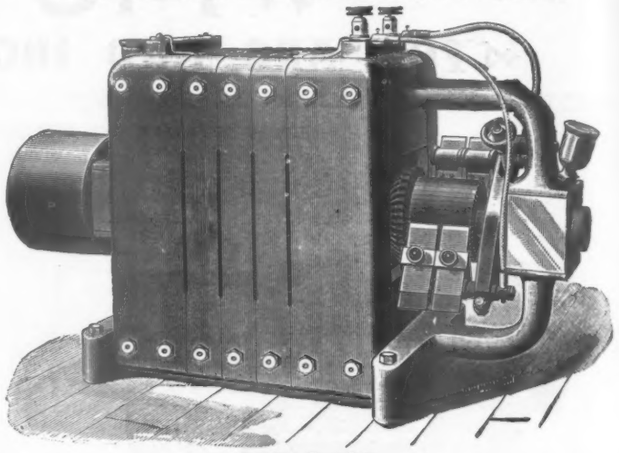

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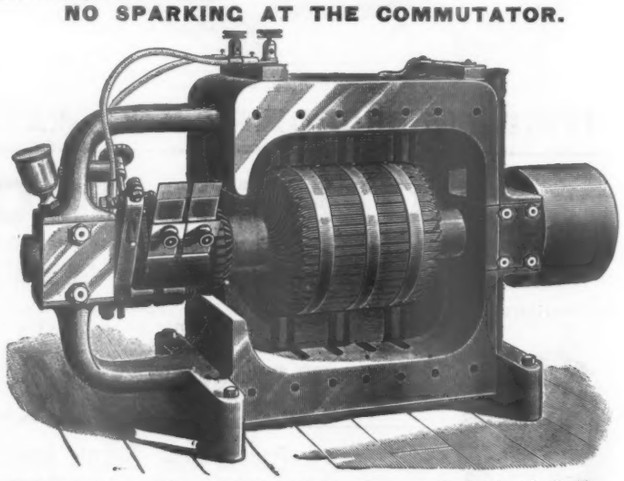

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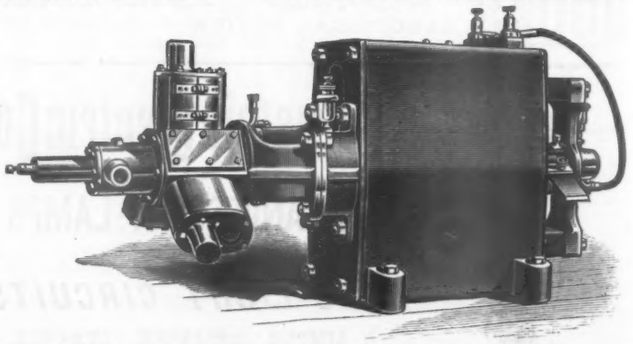

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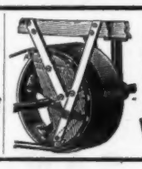

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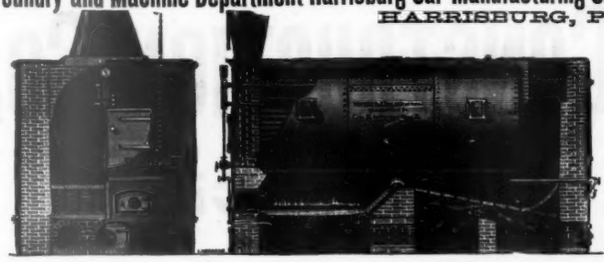

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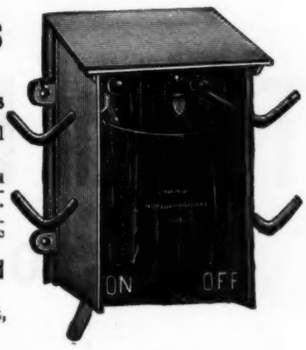

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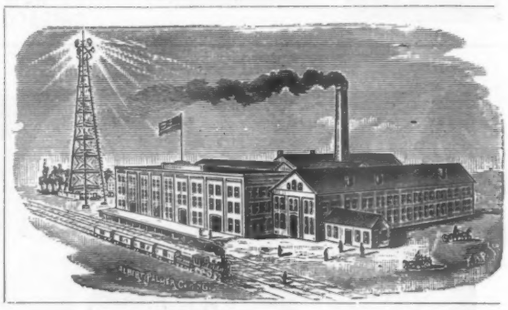

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